(13)

STATE OF CALIFORNIA
The Resources Agency
Department of Water Resources

BULLETIN No. 69-69

CALIFORNIA HIGH WATER
1968-1969

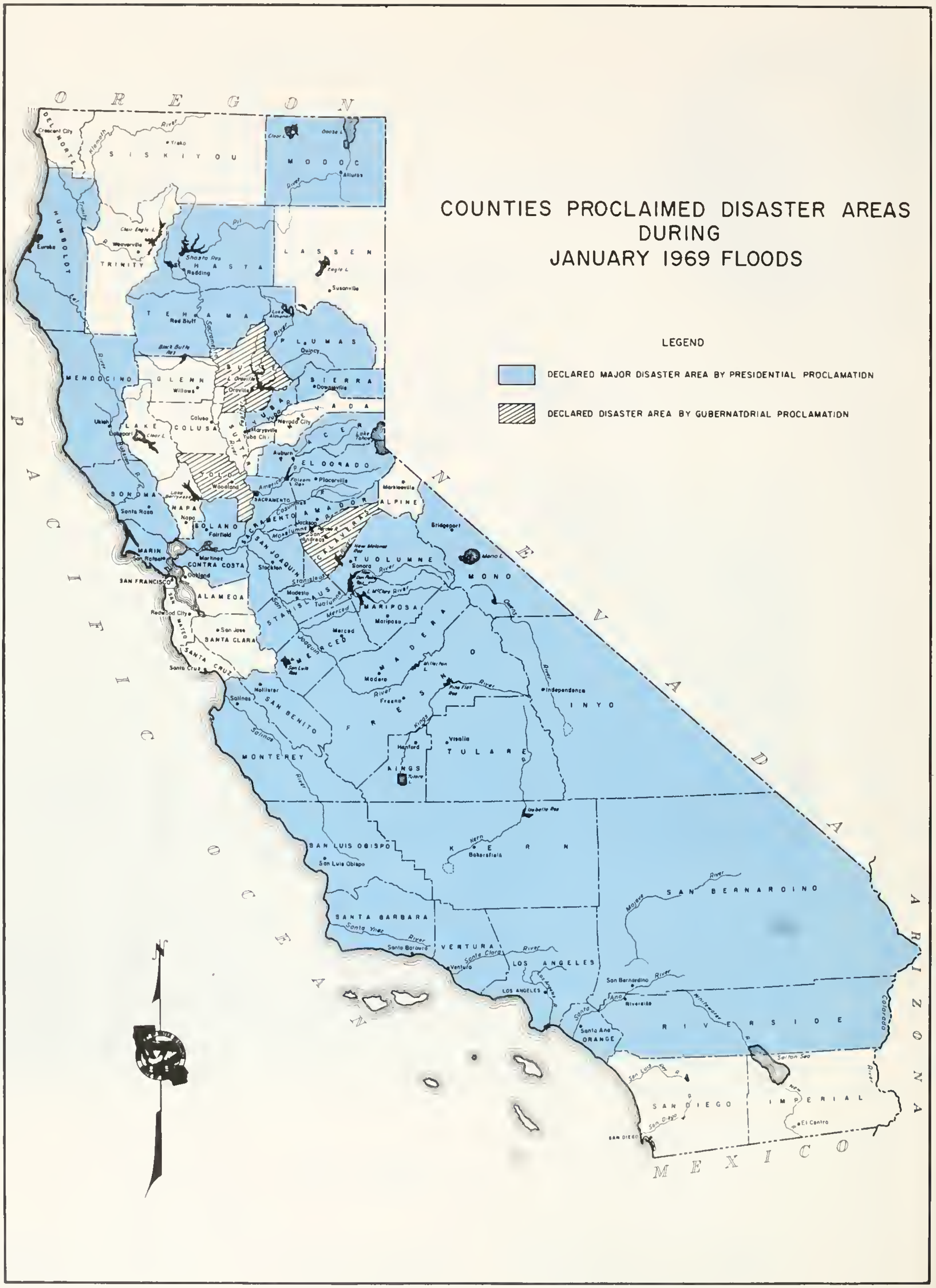
JUNE 1970

NORMAN B. LIVERMORE, JR.
Secretary for Resources
The Resources Agency

RONALD REAGAN
Governor
State of California

WILLIAM R. GIANELLI
Director
Department of Water Resources

PLATE I


COUNTIES PROCLAIMED DISASTER AREAS
DURING
JANUARY 1969 FLOODS
LEGEND
DECLARED MAJOR DISASTER AREA BY PRESIDENTIAL PROCLAMATION
DECLARED DISASTER AREA BY GUBERNATORIAL PROCLAMATION
OREGON
NEVADA
ARIZONA
MEXICO
PACIFIC OCEAN
DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
NEVADA
YUBA
LAKE
COLUSA
SUTTER
PLACER
YOLO
EL DORADO
SONOMA
NAPA
ALPINE
SOLANO
SACRAMENTO
AMADOR
CALAVERAS
MARIN
SAN JOAQUIN
TUOLUMNE
MONO
CONTRA COSTA
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA
SAN MATEO
SANTA CLARA
MERCED
MADERA
SANTA CRUZ
SAN BENITO
FRESNO
INYO
MONTEREY
KINGS
TULARE
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL
Crescent City
Yreka
Alturas
Eureka
Weaverville
Redding
Susanville
Red Bluff
Quincy
Willows
Oroville
Downieville
Nevada City
Colusa
Marysville
Yuba City
Ukiah
Lakeport
Auburn
Placerville
Woodland
Markleeville
Santa Rosa
Napa
Fairfield
Jackson
San Andreas
Bridgeport
San Rafael
Martinez
Stockton
Sonora
Oakland
Modesto
Mariposa
Redwood City
San Jose
Merced
Madera
Santa Cruz
Hollister
Salinas
Fresno
Independence
Visalia
Hanford
Bakersfield
San Luis Obispo
Santa Barbara
Ventura
LOS ANGELES
San Bernardino
Riverside
Santa Ana
El Centro
SAN DIEGO

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

RONALD REAGAN, Governor
NORMAN B. LIVERMORE, JR., Secretary for Resources, The Resources Agency
WILLIAM R. GIANELLI, Director, Department of Water Resources
JOHN R. TEERINK, Deputy Director

Division of Resources Development

Herbert W. Greydanus . . . . Division Engineer

William L. Norn . . . . Chief, Flood Forecasting and Control Branch

This report was prepared under the immediate supervision of

G. M. Norris . . . . Chief, Flood Operations and Flood Control Maintenance Section

by

William A. Arvola . . . . Meteorologist III

Kenneth H. Lloyd . . . . Water Resources Engineering Associate

Jess C. Bringham . . . . Water Resources Technician I

George W. Patrick . . . . Water Resources Technician I

William McKane . . . . Senior Delineator

Elizabeth Freitas . . . . Stenographer II

FOREWORD

Bulletin No. 69-69, the seventh of an annual series, describes, in one report, the general weather patterns, preceding and during storm periods of the 1968-69 water year, precipitation characteristics, and the resulting runoff; and presents information on flooded areas. In addition, tabulations of precipitation comparisons, peak streamflows, and stages, reservoir operations, and streamflow hydrographs are also included. All hydrologic data are considered preliminary.

Data for this Bulletin were supplied by the U. S. Weather Bureau, U. S. Geological Survey, U. S. Army Corps of Engineers, U. S. Bureau of Reclamation, and many other agencies, both public and private. Their cooperation is gratefully acknowledged.

William R. Gianelli

William R. Gianelli, Director
Department of Water Resources
The Resources Agency
State of California
April 3, 1970

ABSTRACT

Statewide precipitation during the 1968-69 water year was near 150 percent of normal. During January 1969, precipitation amounts ranged from 195 percent of normal in the north to 550 percent in the South Coastal area. / January's intense storms continued into February, and during the two months record rainfall amounts resulted in losses of life and property from floods and mud slides. / The intensities of the January-February storms were reflected in the high streamflow volumes experienced in all regions of the State. Major flood control reservoirs in the San Joaquin River basins were encroached into the flood reservation storage and substantial releases were necessary in anticipation of large snowmelt runoff volumes. / River levees were breached in the Sacramento-San Joaquin Delta, on the San Joaquin River, and on the Stanislaus River. Areas in Southern California experienced the severest flooding and storm damage since 1938. San Diego County reported minor damage but in Orange, Los Angeles, Riverside, San Bernardino, and Ventura Counties property damage was extensive. / Red Cross records show 161 persons injured, 40 hospitalized, and 47 deaths as a direct result of the January-February storms and floods. Governor Reagan declared 40 counties as disaster areas. / In addition to record-breaking amounts of rainfall, a massive snowpack had accumulated in the Sierra Nevada. By April 1, the greatest snowpack of record in the Sierra had reached maximum accumulation. / From the Stanislaus River Basin south through the Kern River Basin, 78 out of 109 snow courses set all time records of water content. Statewide, the snowpack water content was 210 percent of the April 1 average. / Forecasts of snowmelt runoff for the April-July period were well above normal. Early in May the Sierra released the heaviest snowmelt of recent time. Most San Joaquin River basins experienced peak snowmelt flows in late May or early June. Flood control releases at all major reservoirs in the San Joaquin River basins were at very high rates to prevent uncontrolled spilling. The high releases caused damage along river channels, particularly the Kings and San Joaquin Rivers. All measures possible were taken to reduce the inflow to Tulare Lake, but over 89,000 acres of land in the lakebed were inundated. / Close cooperation among the Department of Water Resources, U. S. Weather Bureau, U. S. Bureau of Reclamation, U. S. Army Corps of Engineers, and local irrigation districts, during the critical snowmelt problem, helped prevent a major snowmelt flood.

COVER PHOTOGRAPH

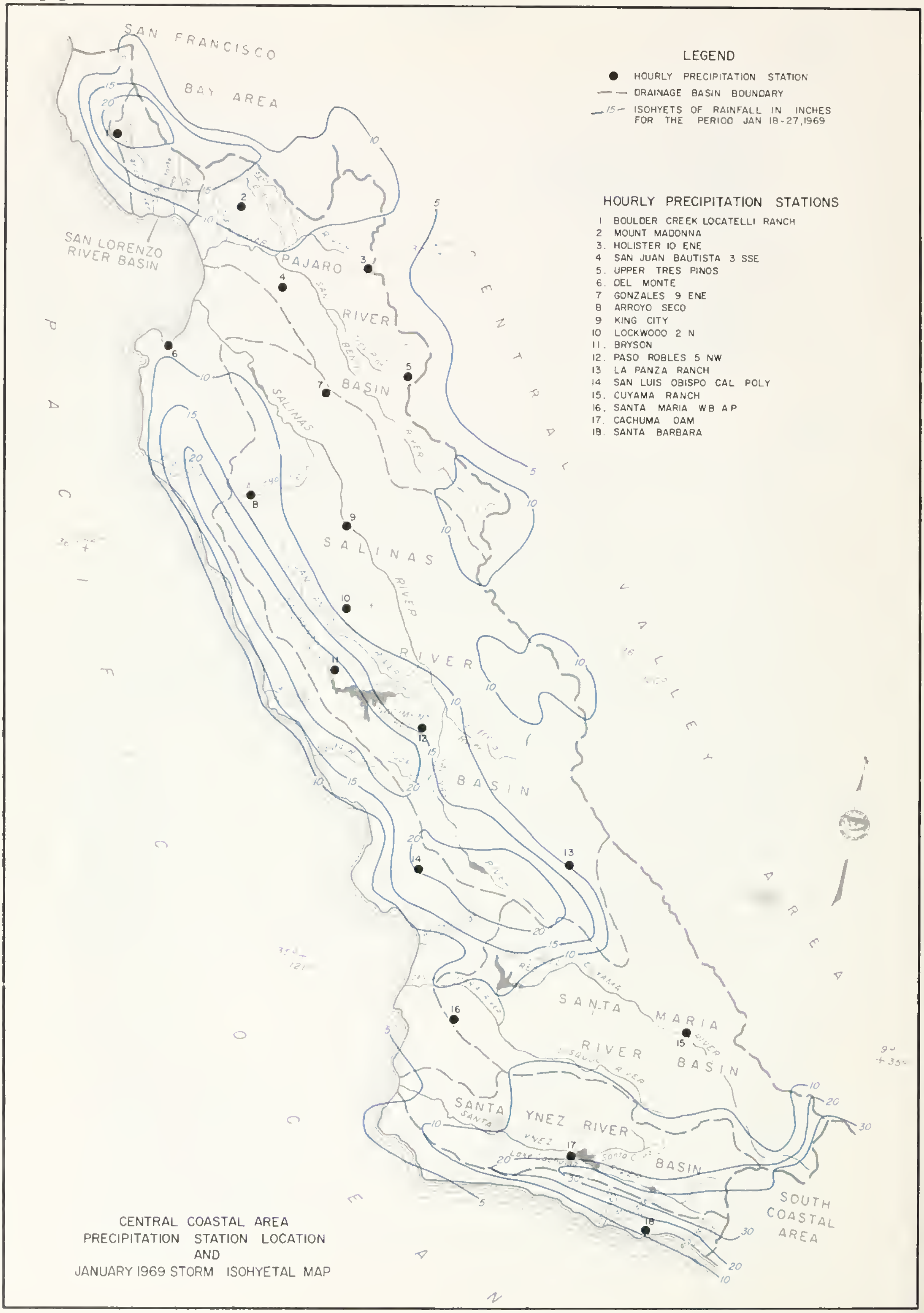
Courtesy of the Associated Press

The Foothill Boulevard Bridge, which crosses Tujunga Wash in San Fernando Valley, was destroyed by the high flows that occurred in February 1969.

TABLE OF CONTENTS

TABLES

PLATES



CENTRAL COASTAL AREA
PRECIPITATION STATION LOCATION
AND
JANUARY 1969 STORM ISOHYETAL MAP

THE WEATHER OF WATER YEAR 1968-69

December 1968

During December, temperatures were below normal, with the negative departures at stations varying from two to seven degrees. Snow accumulation was heavy, especially in the northern mountains. For example, the Weather Bureau office in Mt. Shasta reported the greatest December snowfall since 1952, and valley floor stations, such as Red Bluff and Fresno, had snowfall which was the heaviest for many decades.

The important storm of the month occurred in the period December 22-29. This storm period involved one primary cold front which moved through the State on December 24, followed by a secondary front on the 28th, which extended the period of precipitation through the 28th. The noteworthy event of the storm was the heavy accumulation of snow in the northern mountains.

January 1969

During the January storms, the atmospheric flow pattern, when viewed on the monthly mean circulation charts, showed an area of low pressure north of Hawaii and a ridge of high pressure over western Alaska. The resulting flow of the wind currents favored a long southwesterly fetch of moist, tropical air from the southerly latitudes over California. This flow was especially well-developed in the period January 18-27.

For purposes of discussion, the January storm series will be broken down into the following periods:

January 11-15, 1969 - First storm period in which the initial precipitation covered the State, and the development of the storm patterns.

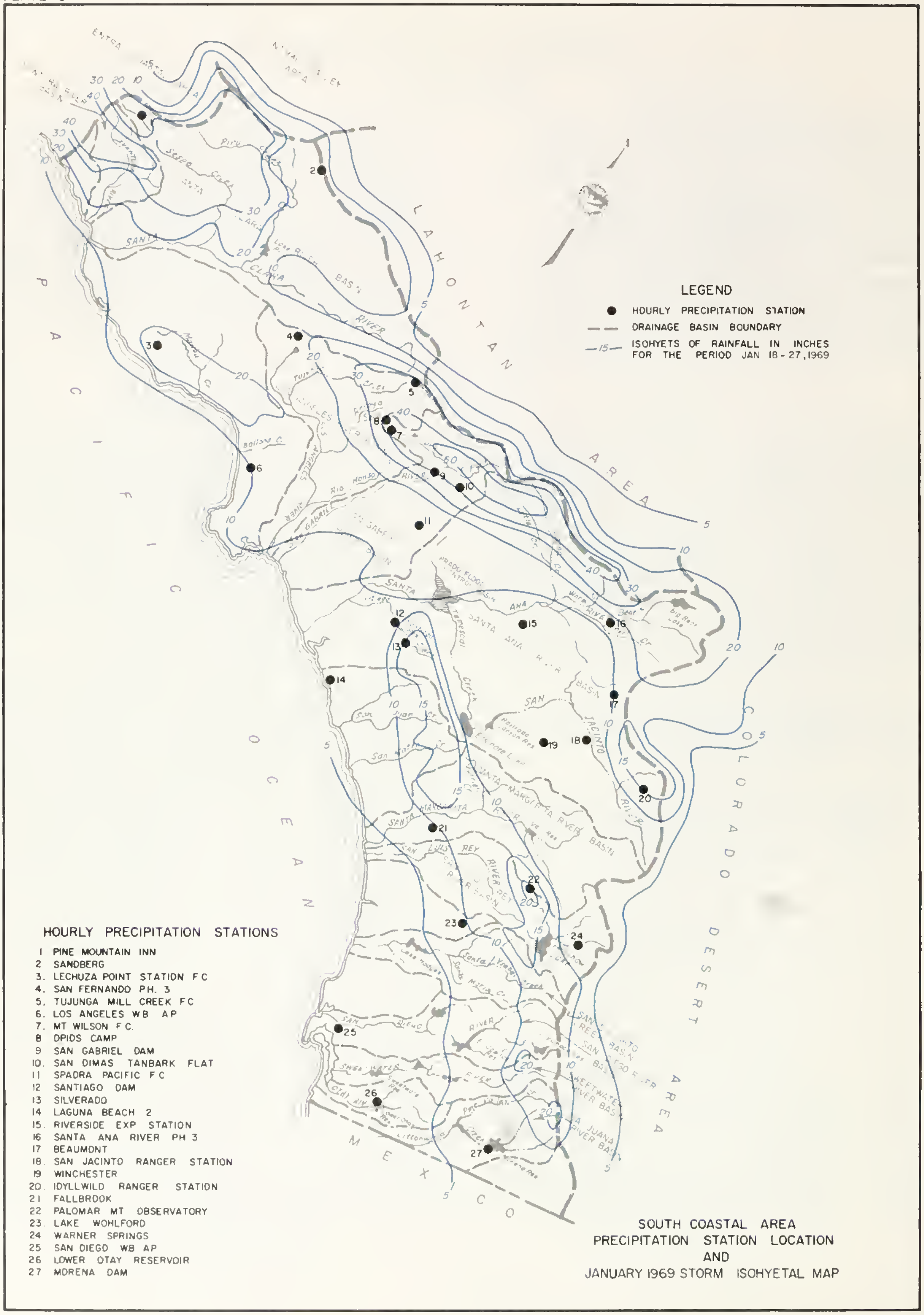
January 18-22, 1969 - Severe storm pattern fully developed with heavy precipitation over the State.

January 24-28, 1969 - A renewal of the pattern after a one-day lull.

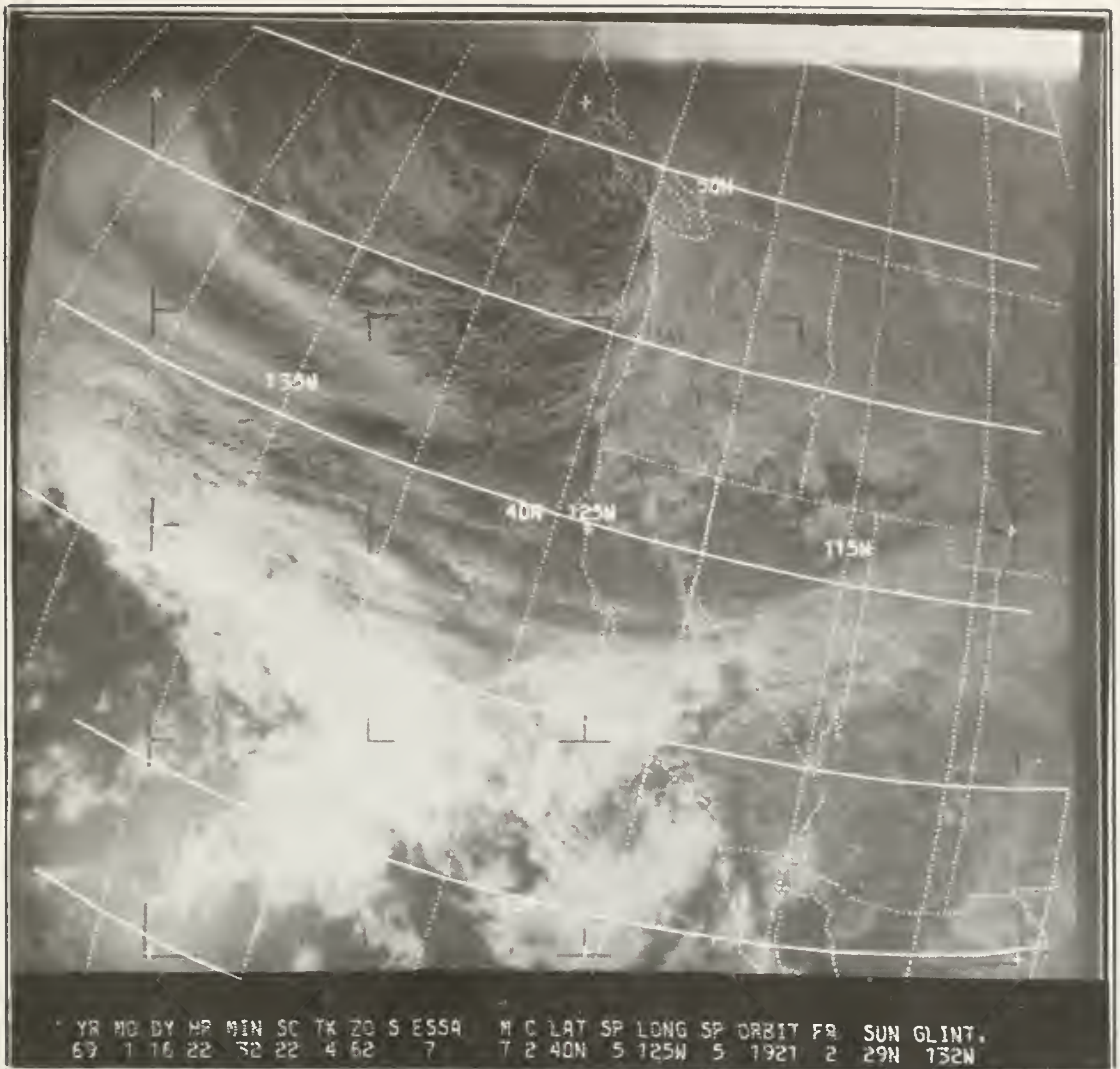
The storm series, which began on January 11, developed when a cold front moved into Northern California. Waves on the front slowed the movement of the front through the State. The passage at San Diego occurred on the evening of the 14th. The precipitation spread southward with the front depositing up to 18 inches in the North Coast basins and up to three inches in Southern California. In the northern part of the State this rainfall was sufficient to cause significant rises on the streams, but in the south there was no appreciable runoff. The precipitation there, however, did provide a wet antecedent condition for the heavier precipitation which came on the 18th.

On January 15 the upper level flow pattern began to resemble the critical pattern which, in the past, has occurred with the flood-producing storms. The flow consists of a confluence of two important air currents: (1) a northerly flow of a cold air mass out of Alaska and moving in a cyclonic bend over the Southern Gulf of Alaska and the States of Washington and Oregon; (2) a westerly or southwesterly current of a warm, moist air mass moving from the southerly latitudes of the Pacific Ocean to the California coastline. The two currents flow together and create a very strong thermal gradient across the flow and generate the jet stream of high velocity winds at the altitudes of 20,000 to 40,000 feet. Weather fronts are involved in the establishment and maintenance of this confluent flow, but they are less important to the precipitation production than the basic strong flow of moist air mass. This strong flow favors efficient orographic precipitation as

PLATE 3



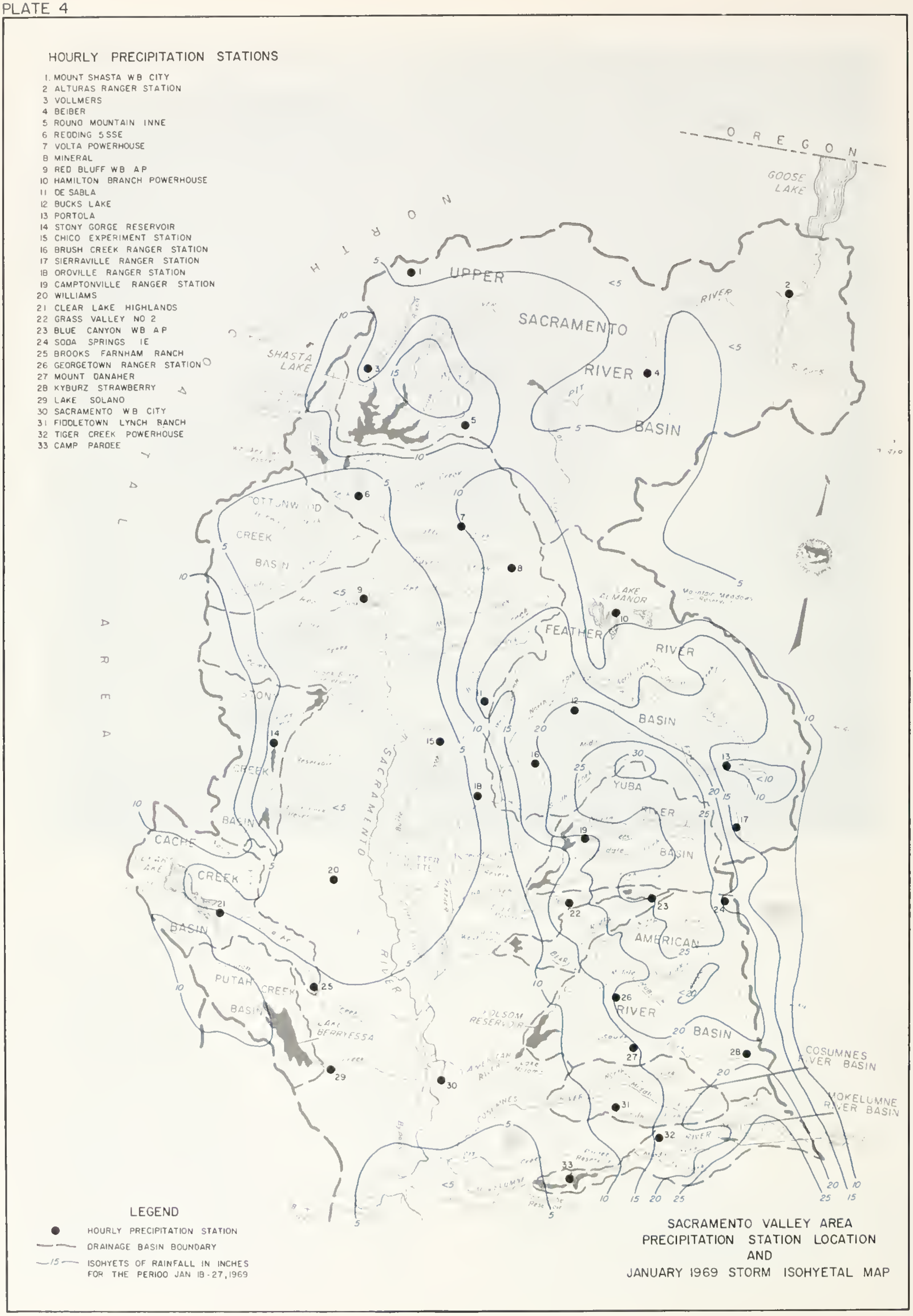
SOUTH COASTAL AREA
PRECIPITATION STATION LOCATION
AND
JANUARY 1969 STORM ISOHYETAL MAP



Satellite picture taken by ESSA-VII on January 16, 1969 at 2232 GMT. This satellite is polar orbiting, and takes 90 minutes to circumnavigate the globe at an elevation of approximately 900 miles. This orbit passes over a given point on the earth's surface at approximately the same time each day. (Photographs courtesy National Environmental Satellite Center, ESSA.)

lift of the moist air occurs over the mountain ranges of California. The pictures available from the weather satellites have been especially helpful in showing the cloud masses associated with the confluent flow of cold and warm air.

To illustrate the cloud pattern before the onset of the heavy precipitation in the period January 18-22, a satellite picture is shown on page 3. The time of the picture was 2232 GMT on January 16, 1969. (In California the time was 2:32PM PST.) No rain was occurring over California, but clouds were present over the southern half of the State. Of interest in the picture is the heavy mass of clouds between longitudes 125 and 130 West. This cloud mass was imbedded in the southwest flow of maritime tropical air, which moved over California two days later and began the heavy rain period. The confluent character of the flow can also be seen in the picture. North of 40° latitude the cloud streaks



SACRAMENTO VALLEY AREA
PRECIPITATION STATION LOCATION
AND
JANUARY 1969 STORM ISOHYETAL MAP

are cyclonically oriented (arc-shaped), while the brighter, heavy cloud south of 35° latitude is in the southwest flow of the tropical air. Other satellite pictures of areas further to the southwest showed an extensive continuation of the cloud mass for 1500 nautical miles into the region of Hawaii.

The precipitation began on the morning of the 18th and covered all the State. The onset time was about the same in the north end of the State as well as in the south end. The intensity of precipitation increased on the following days and reached a maximum either late on the 20th or early on the 21st in the case of the southern stations. At some of the mountain stations in the San Gabriel and San Bernardino Mountains in Southern California, the hourly rate exceeded one inch in the heaviest burst of precipitation. The southern part of the State from San Luis Obispo County through Los Angeles County experienced the heaviest rainfall, although the Sierra Nevada from the Feather River Basin to the Kern River Basin also had substantial amounts. The amounts in the North Coast did not approach those in 1955 and 1964.

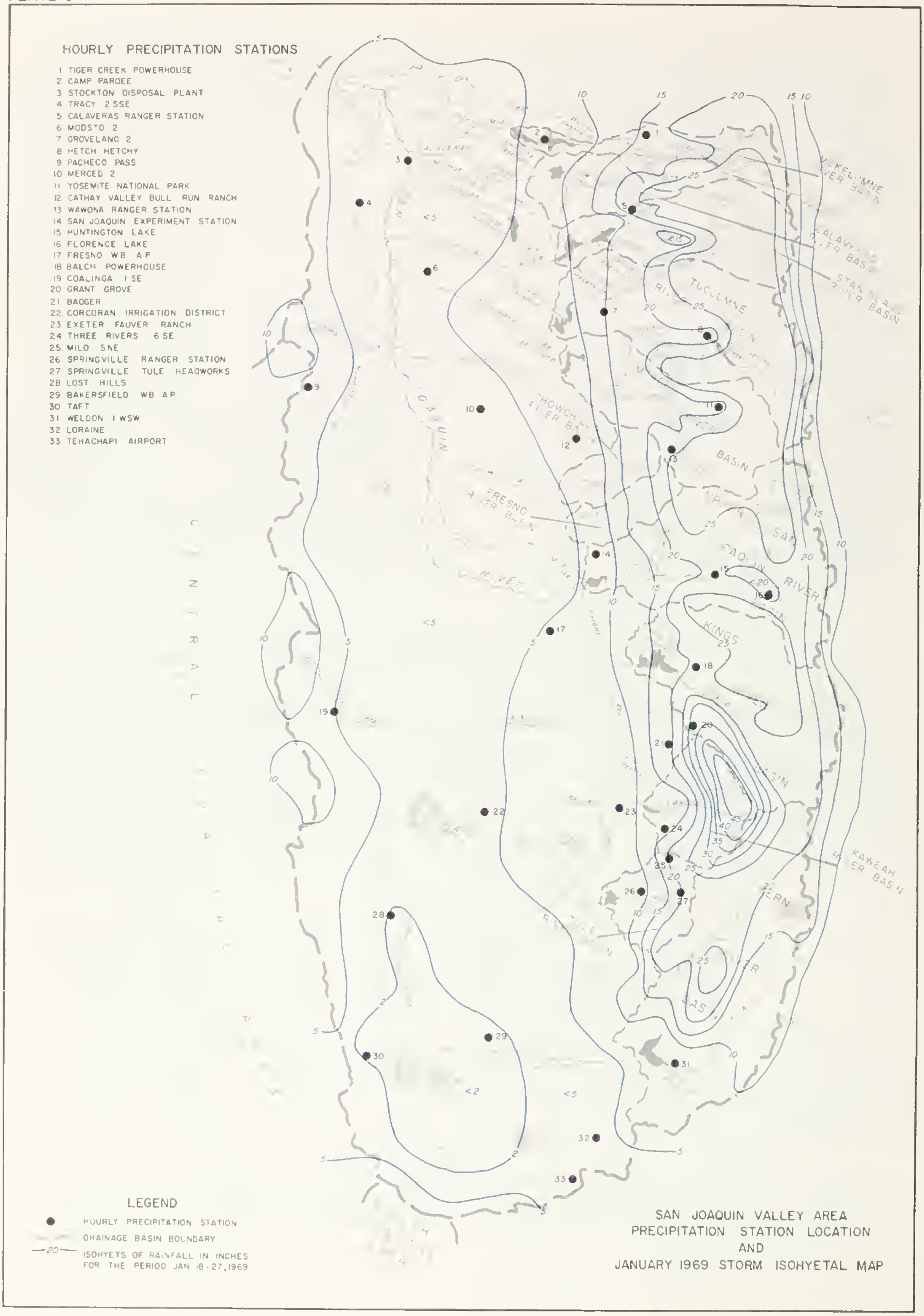
Short period amounts at stations in different sections of the State are tabulated in Table 1.

The precipitation of this first heavy period tapered off by mid-day of the 22nd, and there was a period of about 24 hours before the onset of the next heavy period. This lull in the storm was brought about by the brief build-up of a ridge of high pressure off the coast,which interrupted the steady, southwest flow of moist air which had prevailed since the 18th. The onset of the second period occurred earlier in the south (afternoon of the 23rd) than in the north.

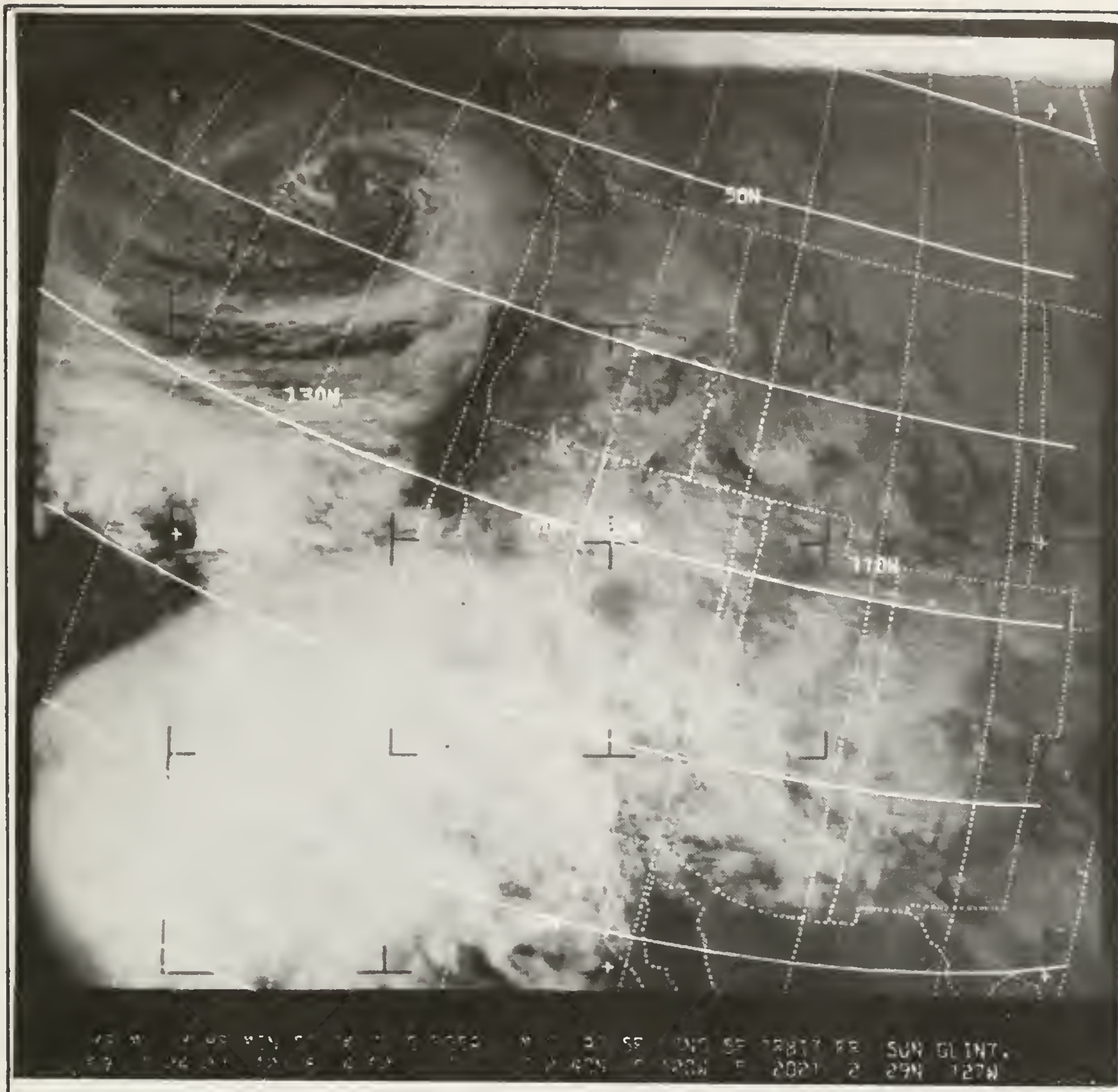
Table 1: Maximum Precipitation Amounts at Selected Stations
Storm of January 18-22, 1969

Station	County	Elev.	1 Hour	2 Hour	3 Hour	6 Hour
Hoopa	Humboldt	345	.25	.44	.58	.97
Laytonville	Mendocino	1,640	.29	.47	.60	1.07
Venado	Sonoma	1,260	.40	.70	1.00	1.70
Brush Creek RS	Butte	3,560	.55	1.08	1.34	2.32
Blue Canyon	Placer	5,280	.31	.60	.85	1.47
Wawona RS	Mariposa	3,965	.57	.92	1.27	2.37
Badger	Tulare	3,030	.62	1.10	1.41	2.61
Three Rivers Edison PH1	Tulare	1,140	.37	.70	1.00	1.98
Milo 5NE	Tulare	3,400	.72	1.43	1.95	3.34
Huasna	San Luis Obispo	715	.86	1.39	1.94	2.87
Cachuma Dam	Santa Barbara	781	.75	1.34	1.54	2.79
Pine Mountain Inn	Ventura	4,200	.80	1.40	1.90	3.70
Opids Camp*	Los Angeles	4,250	1.50	2.50	3.60	5.20
San Gabriel Dam	Los Angeles	1,481	.86	1.44	2.13	3.04
Mt. Baldy FC	San Bernardino	4,275	1.26	2.22	3.15	4.17

*Since this station experiences heavy rainfall, estimated values are included. Ten hours of the record were missing on January 21; 5.52 inches were estimated to have fallen in this period, based on the catch in the nonrecording gage.



SAN JOAQUIN VALLEY AREA
PRECIPITATION STATION LOCATION
AND
JANUARY 1969 STORM ISOHYETAL MAP



Satellite picture taken by ESSA-VII on January 24, 1969 at 2212 GMT, at the beginning of a heavy rainfall period over the southern half of the State. See text page
(Photograph courtesy National Environmental Satellite Center, ESSA.)

Another satellite picture, taken during the second period of heavy precipitation, is shown on page 7. The time of the picture is 2212 GMT (2:12 PM PST) on January 23, 1969. The heavy precipitation, especially in Southern California, was beginning at the time of the picture, and subsequently reached its greatest intensity on the following day. The heavy cloud mass to the southwest of California shows up strikingly as to brightness and areal coverage. The swirl of clouds located near the designator "130 W" is imbedded in cold current of air moving south out of the Gulf of Alaska. The head of the comma shape is located near the surface low pressure center southwest of Vancouver Island. The "lumpy" character of the clouds to the west and southwest of the low indicates the cellular structure of the clouds, probably cumulus or cumulonimbus.

High rates of precipitation were again experienced at mountain stations in Southern California. Amounts accumulated in the second period were heavy in the south, but not as heavy as compared

Table 2: Maximum Precipitation Amounts at Selected Stations
Storm of January 24-27, 1969

Station	County	Elev.	1 Hour	2 Hour	3 Hour	6 Hour	Storm Total Jan. 24-27
Hoope	Humboldt	345	.20	.39	.54	.65	9.13
Laytonville	Mendocino	1,640	.30	.50	.57	.65	10.01
Venado	Sonoma	1,260	.60	1.00	1.20	1.50	15.60
Brush Creek RS	Butte	3,560	.40	.70	.90	1.15	21.47
Blue Canyon	Placer	5,280	.32	.63	.79	1.08	23.78
Wawona RS	Mariposa	3,965	.42	.75	1.01	1.90	22.22
Badger	Tulare	3,030	.41	.73	1.04	1.82	19.79
Three Rivers Edison PH1	Tulare	1,140	.44	.77	.87	1.32	13.77
Milo 5NE	Tulare	3,400	.58	.92	1.23	1.99	20.46
Huasna	San Luis Obispo	715	.50	.75	1.14	1.98	14.11
Cachuma Dam	Santa Barbara	781	.73	1.33	1.85	3.20	15.73
Pine Mountain Inn	Ventura	4,200	.60	1.10	1.60	2.80	22.90
Opids Camp	Los Angeles	4,250	1.50	2.50	3.55	6.35	43.33
San Gabriel Dam	Los Angeles	1,481	1.27	2.48	3.33	5.73	32.55
Mt. Baldy	San Bernardino	4,275	1.05	2.08	2.74	5.18	41.60

Table 3: Comparison of Precipitation Amounts in 1938 and 1969 Storms
at Selected Stations in Southern California

Name of Station 1938	Storm of Feb. 27 - Mar. 4, 1938				Storm of Jan. 18-27, 1969				Name of Station 1969
	1 day	2 day	3 day	4 day	1 day	2 day	3 day	4 day	
Altadena	8.33	10.51	13.26	15.12	7.95	9.76	11.26	11.26	Altadena
Arroyo Seco Company Forestry	8.47	11.70	14.53	16.18	8.84	10.82	12.51	12.54	Arroyo Seco RS
Azusa	6.72	9.02	11.27	12.60	5.33	6.83	7.78	8.60	Azusa City Park
Big Dalton Dam, No. 223	6.58	10.00	13.66	14.90	9.60	12.42	14.60	14.67	Big Dalton Dam
Big Pines County Park	6.80	11.28	12.96	15.55	5.74	9.98	11.93	13.65	Big Pines Park
Big Tujunga Dam No. 1	10.83	13.83	17.11	19.16	11.52	16.79	18.91	18.98	Big Tujunga Dam
Burbank No. 226	6.43	8.86	10.65	12.06	4.43	5.98	6.87	7.67	Burbank FD
Glendale (Lytle)	4.87	8.22	10.72	13.50	6.06	7.59	9.04	9.07	Glendale Stapen
Glendora	8.17	10.61	12.09	14.68	6.00	7.87	9.22	9.22	Glendora West
Haines Canyon (Upper)	10.39	13.34	16.65	18.22	8.63	13.10	14.97	14.97	Haines Canyon Upper
Haines Canyon (Lower)	7.80	10.16	12.86	14.13	8.51	12.79	14.63	14.63	Haines Canyon Lower
La Crescenta No. 251	10.27	13.35	16.70	17.91	8.58	11.49	13.58	13.58	La Crescenta
Lake Arrowhead	14.51	17.91	22.24	29.64	14.24	22.96	25.57	25.66	Lake Arrowhead
Lecheeza Patrol Station	5.84	8.69	11.11	12.36	7.14	8.96	10.61	10.90	Lechuza Patrol Station
Los Angelea	5.88	6.36	9.21	10.68	3.43	5.47	5.85	6.58	Los Angelea Civic Center
Mount Wilson	11.83	15.82	21.75	24.07	11.96	15.99	18.23	18.23	Mount Wilson
Opids Camp	14.92	18.13	23.02	25.46	15.56	21.11	24.10	24.16	Opida Camp
Pasadena (Central Fire House)	4.59	8.23	10.93	14.46	4.62	6.23	7.49	7.49	Pasadena
San Dimas	6.20	8.10	9.77	10.89	3.91	5.76	6.68	7.22	San Dimas Fire WD
San Gabriel Power House	6.47	9.07	11.87	13.48	7.85	9.71	11.16	11.23	San Gabriel Power House
San Gabriel Dam No. 1	8.16	10.08	15.38	18.21	12.36	15.64	17.99	18.07	San Gabriel Dam
Squirrel Inn	10.97	15.67	18.82	23.92	11.33	14.27	16.05	16.15	Squirrel Inn 2
Topanga Canyon RS	6.70	9.87	12.90	14.17	9.54	12.18	14.20	14.20	Topanga Canyon Patrol Stat
Tujunga	6.02	8.09	10.21	12.09	4.45	6.28	8.02	8.02	Tujunga
Upland	5.09	7.54	9.52	10.94	6.38	8.09	9.39	9.39	Upland 3N

Data in Table 3 for the 1938 storm are from the publication "Monthly Weather Review", May 1938.
Data for 1969 atorm taken from U.S. Weather Bureau publication "Hourly Precipitation Data".

with the first period in the Sierra Nevada and the North Coast. Short-period amounts for selected stations equipped with recording rain gages are given in Table 2. The table also includes the storm amount, January 24-27, inclusive.

Because the 1969 storm was the heaviest storm since the storm of March 1938, a comparison of 1-, 2-, 3-, and 4-day amounts at a number of stations in Southern California has been compiled in Table 3.

The snow level is defined as the elevation where the rain changes to snow. In the first period of heavy precipitation, the snow level was about 3,500 feet in the northern end of the State (Klamath River Basin) and 7,000 feet in the southern mountains. In the San Gabriel Mountains of Southern California, the station Mt. Baldy Notch at elevation 7,735 feet reported accumulation of snow during the period. In the Kings River Basin, in the Southern Sierra Nevada, the snow level during the heaviest precipitation was about 6,000 feet, as the station Grant Grove at 6,600 feet reported snowfall from the 20th through the 24th. On January 22, near the end of the precipitation, a cold front moved through the State and brought in a colder air mass. At Squirrel Inn 2 (elevation 5,680 feet) in the San Gabriel Mountains, some snowfall was reported by 5 p.m. on the 22nd, which indicated a rapid lowering of the snow level on that day. The invasion of colder air was also observed in the hourly temperatures at Blue Canyon in the Central Sierra. The temperature fell about 15 degrees between midnight and noon of the 22nd. Table 4 shows snow depths during the January storm.

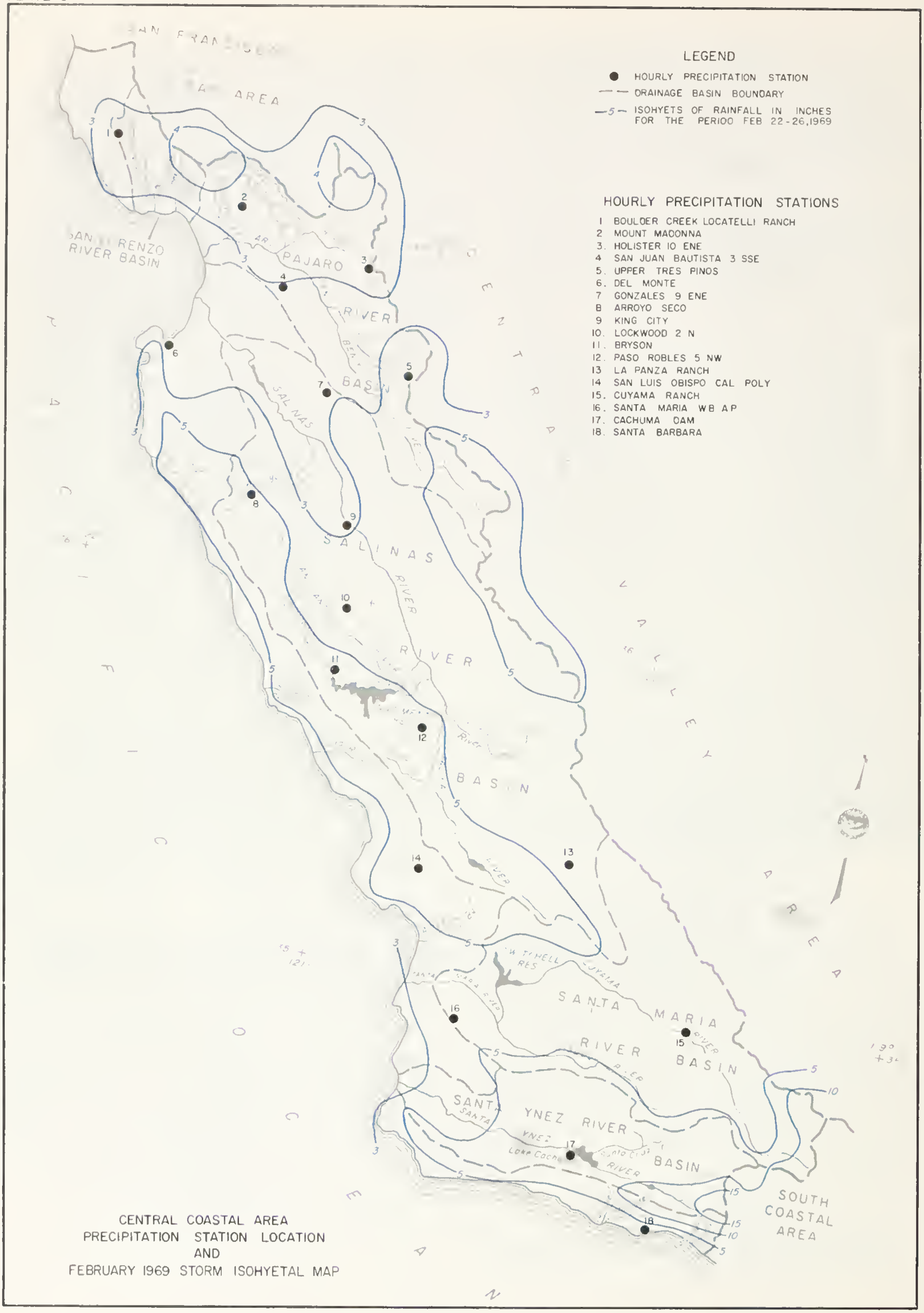
The reestablishment of the confluent pattern on the 24th brought a warming during the second period of heavy precipitation, with the snow level lifting to 4,000 feet in the northern mountains; 5,500 feet in the Central Sierra (American River Basin); 7,000 feet in the Southern Sierra (Kings River Basin); and 7,500 feet in the San Gabriel Mountains. The warming was also observed at the valley floor stations in the San Joaquin and Sacramento Valleys, with the warming on the 24th first showing up in the temperature and dew-point readings in the San Joaquin and then proceeding northward into the Sacramento Valley during the day. The passage of another cold front on January 26 brought a rapid lowering of the snow level. In the cold air following the front, snowfall occurred as low as 5,000 feet in the mountains of Southern California.

Isohyetal maps covering the January storms for the Central Coast, South Coast, Sacramento Valley, San Joaquin and North Coast are shown on Plates 2, 3, 4, 5, and 9. The storm period, varying in length for the various hydrographic areas, covers the important

Table 4: Snow Depths of Selected Stations

Station	Elev. in Feet	Obser. Time	Depth of Snow in Inches - January 18-28, 1969										
			18	19	20	21	22	23	24	25	26	27	28
Mt. Shasta	3,544	8A	22	24	19	17	16	16	15	17	13	14	14
Blue Canyon	5,280	6A	34	31	23	18	24	30	33	28	20	31	38
Grant Grove	6,600	8A	13	12	14	13	26	28	30	28	26	29	34
Mt. Baldy Notch	7,735	4P	0	4	5	17	18	--	--	24	--	--	36
White Mt. 1	10,150	8A	1	8	12	14	20	20	23	57	72	72	70

(Dashes indicate missing observations)



CENTRAL COASTAL AREA
PRECIPITATION STATION LOCATION
AND
FEBRUARY 1969 STORM ISOHYETAL MAP

precipitation. Many supplementary reports of precipitation amounts in Southern California were available in addition to the usual reporting stations.

During periods when the confluent flow was well established, the wind velocities at levels where the flow impinges on the mountains, as well as at higher levels in the atmosphere, were very strong. For instance, at the 500 millibar level (about 18,000 feet), velocities reached 90 to 100 knots, and at the level of the jet stream, 100 to 150 knots. On the 19th, at the beginning of the first heavy period of precipitation, the jet stream crossed the coastline near San Francisco, but by the 21st the location had shifted southward to near Santa Barbara. The brief building of a ridge of high pressure at the 500 mb level on the 23rd broke up the confluent pattern, but the subsequent flattening of the ridge on the 24th brought a renewal of the pattern with the high velocities. During the second period of heavy precipitation (23-26) there appeared to be two jets, one in the San Francisco Bay Area, and the other in Southern California.

February 1969

Although February of 1969 was another wet month in California, the atmospheric flow pattern differed from that of the previous month. On the mean upper-level chart for the month there appeared a trough of low pressure along the West Coast and a ridge of high pressure in the region of Hawaii, where a low pressure center had appeared in the latter area in January. The semi-permanent Aleutian low was divided into two cells with one in the Sea of Okhotsk and the other in the Bering Sea. Cyclonic activity which brought California the above-normal precipitation originated in the West Coast trough.

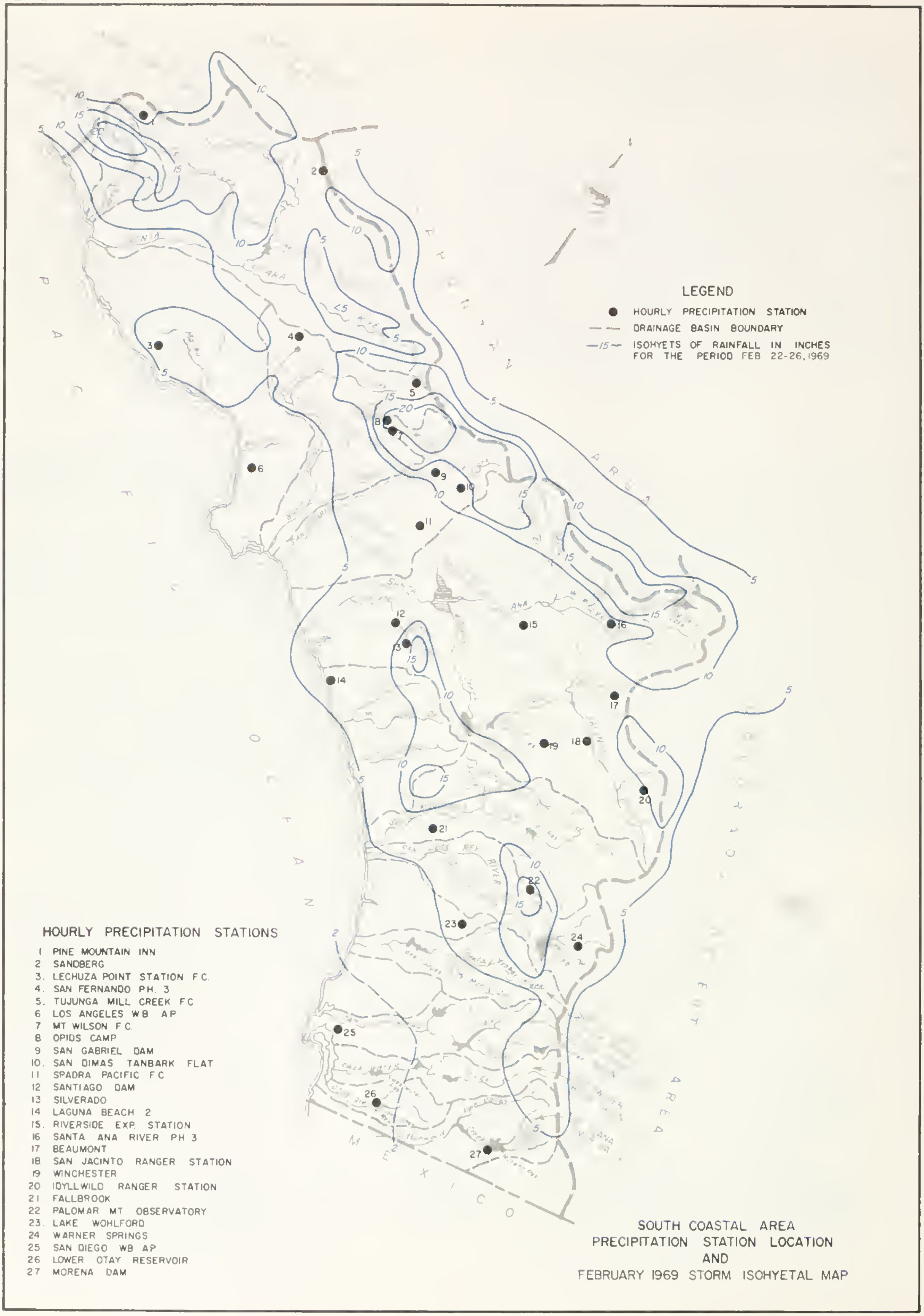
For discussion, the February storm series will be grouped into the following two periods:

February 1-15, 1969 - A period of some light precipitation over the State, but not of the magnitude of the preceding or the following period.

February 21-28, 1969 - A period with a different flow pattern involving a series of fronts moving over the State from the northwest. Table 5 shows daily precipitation amounts during this period at selected stations in Southern California.

Table 5: Daily Precipitation Amounts at Selected Stations
Storm of February 21-28, 1969

Station	County	Elev.	1 Day	2 Day	3 Day	4 Day
Cachuma Dam	Santa Barbara	781	3.97	5.67	6.83	7.58
Twitchell Dam	Santa Barbara	582	1.82	2.54	3.24	3.95
Santa Barbara	Santa Barbara	5	1.76	3.15	3.78	4.53
Thousand Oaks	Ventura	810	3.60	5.70	5.91	6.49
Piru 2 ESE	Ventura	730	3.86	6.29	6.49	7.03
Piedra Blanca Guard Sta.	Ventura	3,065	10.00	12.89	14.34	14.44
Opids Camp	Los Angeles	4,250	9.80	16.72	21.02	21.91
San Gabriel Dam	Los Angeles	1,481	6.33	9.42	12.91	13.71
Pomona	Los Angeles	835	2.52	4.70	6.05	6.72



SOUTH COASTAL AREA
PRECIPITATION STATION LOCATION
AND
FEBRUARY 1969 STORM ISOHYETAL MAP

The first half of the month had light precipitation in three periods, 4-6th, 8-12th, and 14-15th. This precipitation came with weather fronts moving over the State. The fronts were the typical winter systems which bring precipitation for two- to four-day periods, in contrast to the sustained moist flow of the confluent pattern.

In the second half of February, more intense weather systems brought heavier precipitation. Especially affected was Southern California, which had been hit so hard in January. A migratory low Center moving out of the Aleutian low into California set up the West Coast trough as an effective steering current for a sequence of many following storm systems. A cold front came on February 21, followed by a second on February 23. The second front became semistationary in the Los Angeles area on the 25th and prolonged the precipitation until the 26th. Data at supplementary stations were collected by the U. S. Weather Bureau for the 5-day period February 22-26. These reports, plus the usual climatological reports, were used in drawing the isohyetal maps for the Central and South Coast shown in Plates 6 and 7. Totals vary from 8 inches in the upper Salinas River Basin to 20 inches in the Santa Ynez and San Gabriel Mountains.

The snow level in the period February 22-26 was lower than the January period of heavy precipitation: 3,500 feet in the north and 4,500 feet in the south. With the stalling of the front in Southern California on February 24, the snow level lifted about 1,000 feet. Snow accumulations continued in the mountains. Data at representative stations in various parts of the State are shown in Table 6.

Table 6: Snow Depths at Selected Stations

Station	Elev. in Feet	Obser. Time	Depth of Snow in Inches - February 21-26, 1969					
			21	22	23	24	25	26
Mt. Shasta	3,544	8A	16	16	28	34	38	34
Manzanita Lake	5,850	8A	81	80	84	90	95	94
Squaw Valley	6,235	8A	99	96	106	112	121	131
Blue Canyon	5,280	6A	77	75	80	87	98	110
Calaveras Big Trees	4,696	8A	46	46	54	66	78	86
Grant Grove	6,600	8A	86	95	98	108	138	146
Huntington Lake	7,020	5P	105	105	114	139	148	147
Yosemite Nat'l Park	3,970	7A	17	16	24	26	38	48
Palomar Mt. Observatory	5,545	1P	12	22	24	18	14	8
Squirrel Inn 2	5,680	5P	25	34	42	47	36	35
White Mt. 1	10,150	8A	60	62	62	69	83	81
White Mt. 2	12,470	1P	74	75	75	82	94	93
Bishop WB Airport	4,108	Mid	6	7	5	9	11	9

Table 7: Precipitation Comparison for Six Storms North Coastal and Sacramento Valley Basins **

Station	One Day Dec. 1955	One Day Oct. 1962	One Day Jan-Feb 1963	One Day Dec. 1964	One Day Jan. 1967	One Day Jan. 1969	Two Days Dec. 1955	Two Days Oct. 1962	Two Days Jan-Feb 1963	Two Days Dec. 1964	Two Days Jan. 1967	Two Days Jan. 1969
North Coast												
Alderpoint	5.06	3.83	3.70	5.85	2.2[illegible]	3.90	6.96	6.30	[illegible].40	10.35	4.20	6.61
Cummings	7.00	4.03	5.08	11.20	4.06	4.50	11.00	7.64	7.65	18.04	6.74	7.68
Gasquet RS	7.29	3.82	2.47	6.35	3.81	2.81	10.19	6.32	4.43	10.39	5.77	4.51
Mad River RS	4.04	3.94	4.63	7.87	2.08	3.00	7.55	6.67	6.93	14.77	3.65	5.05
Orleans	3.50	3.23	1.92	7.38	2.34	2.01	[illegible].55	4.29	3.52	11.07	4.55	3.88
Scotia	5.39	1.93	1.86	5.13	1.62	3.08	7.19	3.76	2.99	7.35	2.66	5.29
Cloverdale 3 SSE	6.25	8.37	3.30	3.97	4.63	3.59	9.08	11.30	6.33	7.82	6.24	7.06
Guerneville	7.68	5.30	3.03	3.70	6.91	3.95	9.81	7.58	5.89	6.45	9.32	5.65
Healdsburg	3.73	4.89	5.08	4.28	4.31	3.83	6.65	8.34	9.97	8.35	8.21	7.16
Saint Helena	5.76	5.58	4.63	4.02	6.83	2.57	7.99	9.08	8.16	7.60	9.68	4.02
Sacramento Valley												
Red Bluff WB AP	0.96	1.90	1.23	1.08	1.77	1.70	1.79	3.16	2.41	1.89	3.11	2.74
Shasta Dam	8.24	3.54	2.64	11.64	3.32	7.42	12.28	6.22	5.01	15.22	4.94	10.70
Paskenta RS	2.42	2.15	2.65	3.04	1.93	1.56	3.48	3.38	3.80	4.41	2.83	2.92
Sacramento WB	2.41	3.63	1.70	1.79	2.87	1.46	3.81	5.80	3.09	2.92	4.09	2.48
Marysville	2.27	4.24	2.03	0.74	1.72	2.47	4.10	7.29	3.38	1.10	3.12	3.47
Brush Creek	8.68	11.40	4.99	9.41	8.25	6.00	11.93	18.75	9.78	14.56	12.40	7.99
Blue Canyon WB AP	7.44	7.37	6.70	9.33	6.27	4.61	13.36	13.81	13.96	15.24	10.25	9.16

Station	Three Days Dec. 1955	Three Days Oct. 1962	Three Days Jan-Feb 1963	Three Days Dec. 1964	Three Days Jan. 1967	Three Days Jan. 1969	Four Days Dec. 1955	Four Days Oct. 1962	Four Days Jan-Feb 1963	Four Days Dec. 1964	Four Days Jan. 1967	Four Days Jan. 1969
North Coast												
Alderpoint	[illegible].76	8.45	7.68	13.60	4.48	7.94	9.[illegible]1	10.95	[illegible].16	14.70	5.20	8.04
Cummings	12.20	11.01	9.83	22.70	7.61	9.28	15.[illegible]	13.28	10.59	25.44	8.57	9.47
Gasquet RS	11.39	8.20	5.10	13.90	6.56	5.82	14.02	9.29	7.06	17.16	7.78	7.12
Mad River RS	9.77	8.23	--	--	4.67	7.55	12.44	10.96	--	(5 days 21.07	5.54	7.63
Orleans	7.54	6.15	5.09	13.63	5.50	4.66	9.46	7.83	5.50	14.50	6.44	4.94
Scotia	8.62	5.01	4.46	9.10	2.94	5.81	11.53	6.49	4.99	9.68	3.76	5.95
Cloverdale 3 SSE	9.75	11.77	9.07	10.19	7.64	7.80	14.60	11.82	9.26	11.27	7.64	8.06
Guerneville	10.18	8.40	8.71	7.57	10.55	6.45	14.84	8.82	8.81	8.68	10.55	6.45
Healdsburg	7.66	9.64	10.75	9.50	8.25	10.11	9.98	10.52	11.19	10.24	8.28	10.11
Saint Helena	9.08	10.64	9.45	9.14	9.90	6.31	12.58	11.29	9.87	9.49	9.90	7.62
Sacramento Valley												
Red Bluff WB AP	2.45	3.42	3.46	1.95	3.19	3.00	2.73	3.51	3.49	2.41	3.19	3.29
Shasta Dam	16.23	7.59	6.27	18.60	5.09	11.48	22.15	10.27	6.56	21.38	6.24	11.65
Paskenta RS	4.43	3.64	3.85	4.85	2.97	3.55	5.93	4.08	3.85	5.10	2.97	3.56
Sacramento WB	4.11	6.69	3.60	3.38	4.09	3.44	5.16	6.85	3.65	3.72	4.23	3.89
Marysville	4.31	9.26	3.58	1.37	3.58	4.08	5.45	9.31	3.69	1.63	3.59	4.34
Brush Creek	13.64	23.70	12.55	18.76	13.20	12.86	18.08	25.99	12.95	20.78	13.20	14.85
Blue Canyon WB AP	18.55	19.55	16.01	19.79	10.36	13.02	20.66	22.02	17.38	22.93	10.47	14.89

Table 8: Precipitation Comparison for Six Storms San Joaquin, Central Coast and Southern California ***

Station	One Day Mar. 1938	One Day Nov. 1946	One Day Jan. 1952	One Day Nov. 1965	One Day Dec. 1966	One Day Jan. 1969	Two Days Mar. 1938	Two Days Nov. 1946	Two Days Jan. 1952	Two Days Nov. 1965	Two Days Dec. 1966	Two Days Jan. 1969
San Joaquin Basin												
Fresno WB	2.05	0.64	1.74	0.57	99	2.21	2.84	.83	1.81	.86	1.95	2.83
Yosemite NP	3.23	2.58	1.90	2.52	4.05	3.60	4.54	5.13	3.62	3.74	7.22	6.28
Springville	2.95	4.15	1.27	0.77	8.46	3.34	4.96	4.71	2.39	1.54	13.29	5.88
Central Coast												
Los Gatos	1.89	3.18	4.82	1.02	1.49	2.34	3.11	3.52	6.66	1.93	1.94	3.87
Salinas FAA	0.85	0	1.30	1.23	1.58	1.25	1.30	0	1.50	1.41	2.72	2.07
Paso Robles FAA	1.25	2.45	1.02	1.85	3.07	3.09	2.48	2.51	1.30	2.42	4.97	4.50
Santa Maria WB	1.93	1.08	1.20	1.88	1.04	1.22	2.25	1.30	2.21	2.18	1.79	2.14
Santa Barbara	3.59	2.15	5.29	3.49	2.42	3.96	5.82	2.33	6 74	4.05	2.74	6.16
South Coastal Basins												
Cuyamaca	7.65	2.95	2.72	9.60	6.04	4.10	10.14	3.72	5.09	10.69	11.79	6.97
Riverside Fire Station #3	--	1.29	1.68	1.46	2.08	2.19	--	1.79	2.06	2.76	2.30	3.09
La Mesa	2.00	1.21	1.60	2.09	2.72	2.56	2.76	1.66	2.67	3.28	3.02	2.86
Los Angeles AP	5.88	2.67	1.61	2.12	1.49	2.63	6.36	3.85	2.56	2.81	1.78	4.33
Oxnard	3.30	4.30	3.22	2.51	1.86	2.88	4.96	5.58	4.16	3.39	1.88	4.60
San Diego WB	1.56	.88	1.29	1.53	1.34	0.70	2.27	1.15	1.70	2.32	2.07	1.30

Station	Three Days Mar. 1938	Three Days Nov. 1946	Three Days Jan. 1952	Three Days Nov. 1965	Three Days Dec. 1966	Three Days Jan. 1969	Four Days Mar. 1938	Four Days Nov. 1946	Four Days Jan. 1952	Four Days Nov. 1965	Four Days Dec. 1966	Four Days Jan. 1969
San Joaquin Basin												
Fresno WB	3.03	.83	1.81	1.32	2.47	3.21	3.05	. 33	1.81	1.58	2.47	3.31
Yosemite NP	5.74	5.13	3.63	4.48	7.61	7.93	5.95	5.13	3.66	5.72	8.48	9.59
Springville	6.39	4.71	2.49	2.01	17.39	7.35	7.56	7.25	2.91	2.47	17.41	8.47
Central Coast												
Los Gatos	3.27	3.52	7.23	2.47	2.31	5.00	3.32	4.40	9.19	3.04	3.11	5.88
Salinas FAA	1.52	0	1.79	1.41	2.72	2.80	1.65	0	2.20	2.34	2.89	3.41
Paso Robles FAA	3.15	2.51	1.53	2.89	5.64	5.82	3.26	2.9[illegible]	2.04	3.30	5.64	6.31
Santa Maria WB	2.51	1.41	2.23	2.24	1.81	3.08	2.53	1.54	3.07	2.52	1.81	3.45
Santa Barbara	6.58	2.33	6.94	4.76	3.21	8.18	6.58	3.28	8.79	5.08	3.21	8.40
South Coastal Basins												
Cuyamaca	11.08	4.05	5.66	10.99	14.56	9.21	13.54	4.45	5.77	11.90	17.15	9.57
Riverside Fire Station #3	--	1.94	2.94	2.96	3.60	3.49	--	1.94	3.06	3.40	4.40	3.51
La Mesa	4.06	1.82	2.87	3.28	4.02	2.90	4.34	1.85	2.88	3.63	4.32	2.90
Los Angeles AP	6.74	4.96	3.69	3.12	1.99	5.04	6.74	5.53	4.89	3.55	3.38	5.29
Oxnard	4.96	6.18	6.30	4.76	1.88	5.66	4.96	6.25	7.24	5.22	2.62	5.73
San Diego WB	2.80	1.20	2.29	2.72	2.47	1.70	2.89	1.24	2.29	2.86	2.99	1.71

The underlined value is the maximum value for the six storms listed.

**Dates of Storm Periods Used:

Dec. 15-31, 1968
Oct. 9-14, 1962
Jan. 29-Feb. 2, 1963
Dec. 18-30, 1964
Jan. 19-31, 1967
Jan. 10-30, 1969

***Dates of Storm Periods Used:

Mar. 1-15, 1938
Nov. 8-24, 1946
Jan. 12-19, 1952
Nov. 14-26, 1965
Dec. 1-8, 1966
Jan. 19-30, 1969

RAINFALL-RUNOFF

Early in December, statewide precipitation since the beginning of the 1968-69 water year was below normal, and California's drainage basins were relatively dry. Then, on December 10, the first major storm of the season moved into Northern California. A series of storms followed, and by the end of the month, statewide precipitation totals were well above normal, except in Southern California and a few areas in the central part of the State. During the early storms, much of the precipitation was absorbed by the soil, limiting runoff and causing only minor rises in streams of the North Coast and the upper Sacramento Valley. However, as the storms continued, the basins became saturated and streamflows increased.

During the first half of January, light precipitation occurred. However, in the latter half of January, rain and snow were persistent and heavy. Precipitation totals for the month were generally above normal in all parts of the State. New records for precipitation amounts and intensities were established at a number of stations. From Blue Canyon and Sacramento southward through the Los Angeles area, many stations reported the wettest January in many years, and at some stations the wettest January of record. New 5-minute, 10-minute, and 15-minute intensity records were set at San Francisco, and a new 24-hour record was set at Fresno.

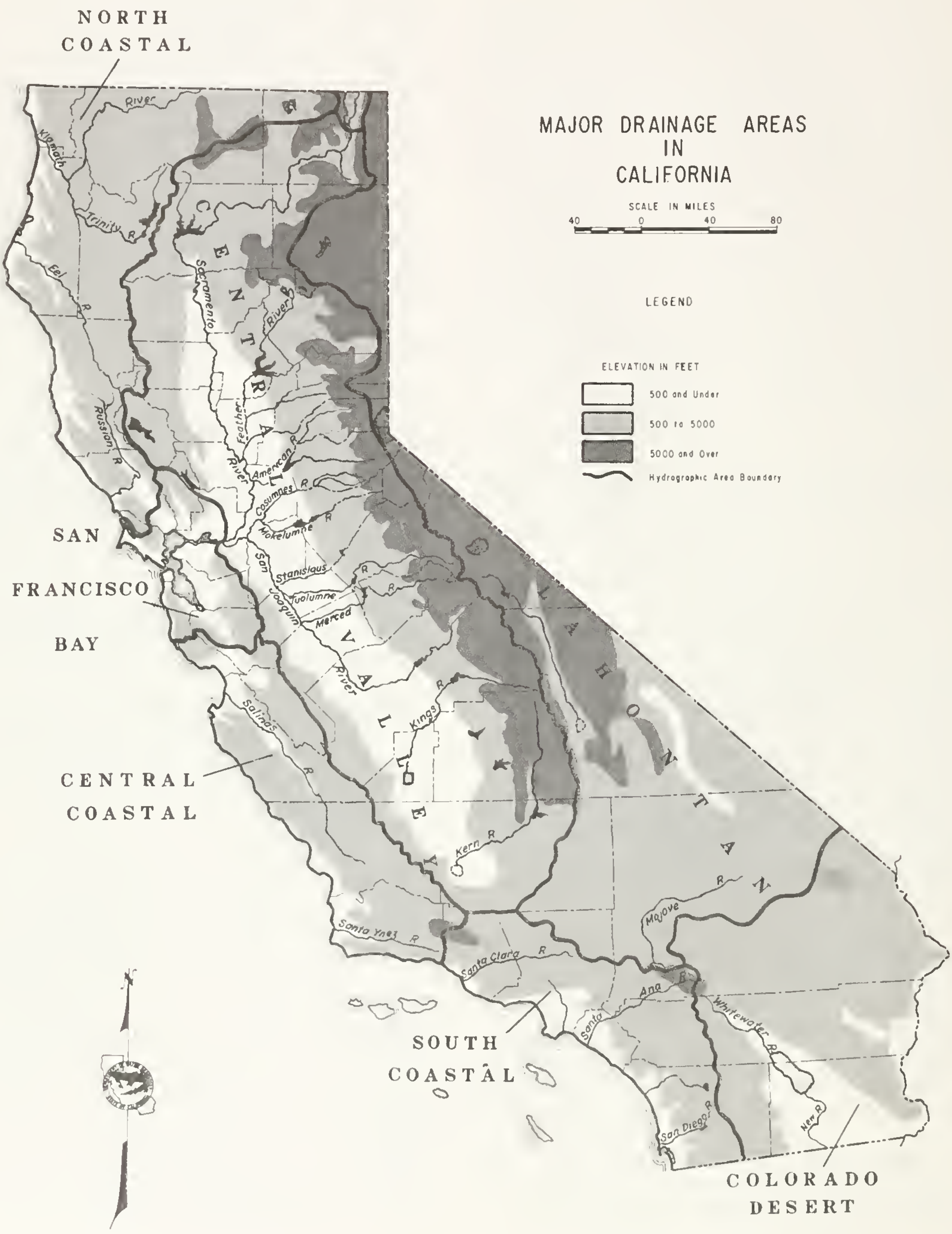
Statewide precipitation during January was 300 percent of normal, ranging from 195 percent in the north to 550 percent in the South Coastal area. During the last two weeks of January, torrential rain touched every corner of the State, from the normally wet North Coast to the desert of Imperial County.

The resulting streamflows were far above normal in all basins. In the North Coastal area, January runoff in five major streams was 290 percent of normal, ranging from 170 percent for the Trinity River to 310 percent for the Eel River. Runoff in the major San Francisco Bay and Central Coastal streams ranged between 350 and 760 percent of normal. In the Sacramento River Basin, January streamflow was 370 percent of normal; and in the San Joaquin River and Tulare Lake Basins, record January flows occurred with an aggregate runoff exceeding 680 percent of normal. In the South Coastal area, January runoff far surpassed any January total of record, being greater than 2,000 percent of normal.

Storm activity continued over most of the State through February. During the month, precipitation was again well above normal except in the extreme north and the Colorado Desert area. Statewide precipitation for the month was 190 percent of normal. In the South Coastal area, February precipitation averaged 280 percent of normal over the entire area. At Los Angeles, the precipitation during January and February provided the largest two-month total since the year 1884.

Although not approaching the record flows of January, high runoff volumes occurred again in February in the coastal regions of Southern California. Streams in the area discharged over 800 percent of average flows.

In the Sacramento River Basin, Sacramento had the sixth wettest February of record. February precipitation averaged 180 percent of normal over the entire area, with the valley floor averaging 210 percent of normal. Total runoff in the Sacramento Valley streams during the month was 170 percent of normal. In the San Joaquin River Basin, the Fresno precipitation station measured the greatest amount of precipitation of record for February, and the greatest 24-hour amount since the year 1918. February runoff in the streams tributary to the San


MAJOR DRAINAGE AREAS
IN
CALIFORNIA
SCALE IN MILES
40 0 40 80
LEGEND
ELEVATION IN FEET
500 and Under
500 to 5000
5000 and Over
Hydrographic Area Boundary
NORTH
COASTAL
SAN
FRANCISCO
BAY
CENTRAL
COASTAL
SOUTH
COASTAL
COLORADO
DESERT
CENTRAL VALLEY
LAHONTAN
Klamath
River
Trinity R
Eel R
Russian R
Sacramento River
Feather River
American R
Cosumnes R
Mokelumne R
San Joaquin River
Stanislaus R
Tuolumne R
Merced
Kings R
Kern R
Salinas R
Santa Ynez R
Santa Clara R
Santa Ana R
Mojave R
Whitewater R
San Diego R
New R

Joaquin Valley was 250 percent of normal for the month.

The intensities of the January and February storms were reflected in the high runoff volumes experienced in all regions of the State. Storm and flood damage occurred in the North Coast Basins through the Central Valley and Central Coastal basins to the San Diego area. Levees broke in the Sacramento-San Joaquin Delta, and on the San Joaquin River and its tributaries, causing flooding of agricultural lands, farm equipment, and homes. In California's coastal basins, streams and drainage canals overflowed, causing widespread inundation. Numerous mud slides destroyed homes and buried highways.

Red Cross records show 161 persons injured, 40 hospitalized, and 47 dead as a result of the January-February storms. Governor Reagan declared 40 counties to be disaster areas; 37 of these were declared major disaster areas by Presidential Proclamation.

In addition to record breaking amounts of rainfall, a massive snowpack had accumulated in the higher elevations. In December, Mt. Shasta received the greatest snowfall for the month since 1952 and Red Bluff, on the valley floor, the greatest since 1931. Even as far south as Fresno, snowfall was the heaviest since 1911.

January storms laid an abnormally heavy blanket of snow on top of an already above-average snowpack. Below normal temperatures during January not only prevented a normal amount of snowmelt from low elevations, but again resulted in snowfall in areas which ordinarily experience rain. By the end of January, the snowpack in the Sierra and Cascade watersheds was twice the normal amounts.

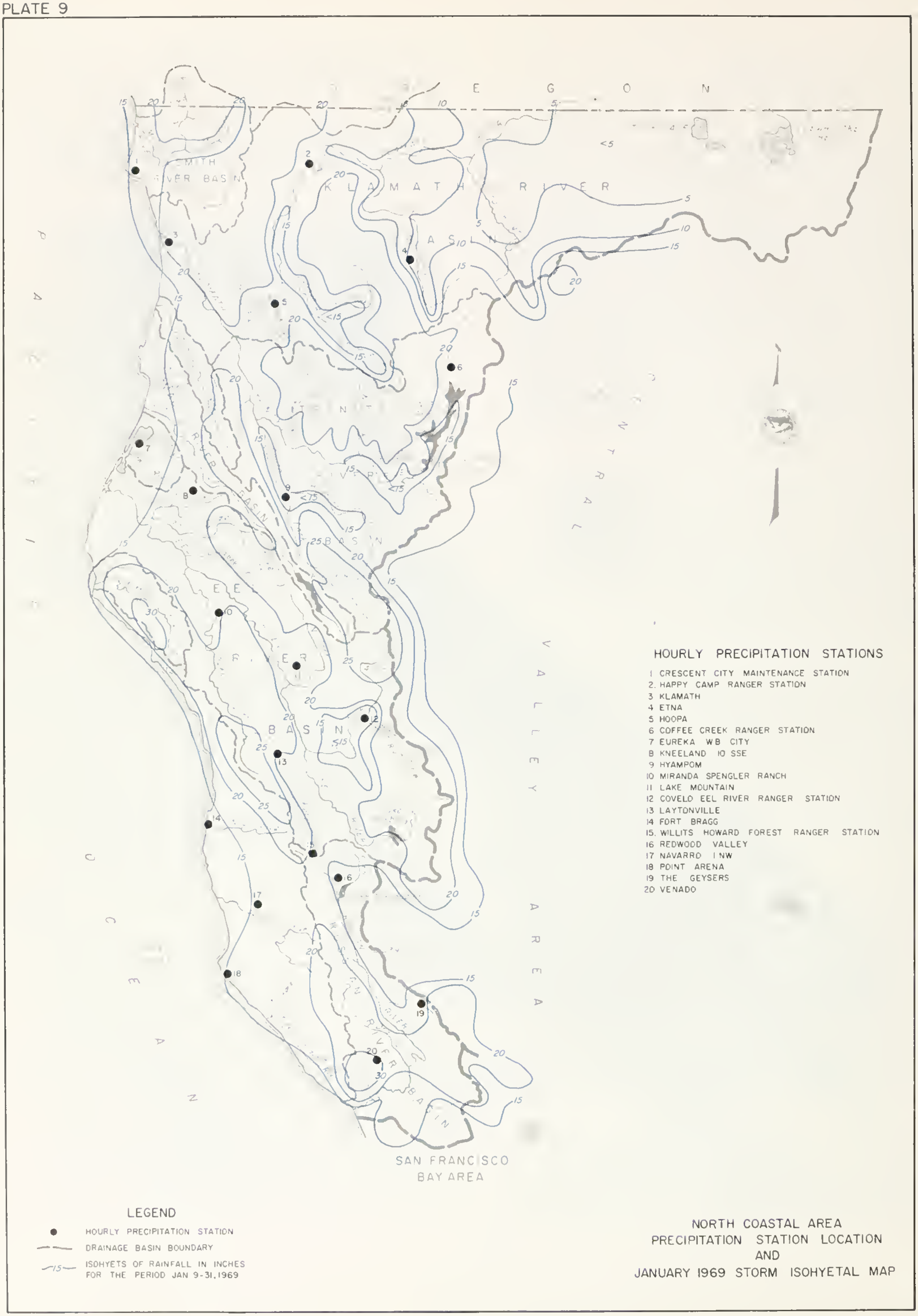
By April 1, the greatest snowpack of record in the Sierra had reached maximum accumulation and was beginning to release the heaviest snowmelt runoff of recent time. The snowpack water content ranged from a high of 295 percent of normal in the Kern River Basin to 205 percent of normal in the Stanislaus River Basin. In the Kern and Kaweah Basins, new records were set for maximum water content.

The forecasts of runoff for the April through July period were well above normal for all the State's snow-fed streams. To compound a critical situation, the January and February rainfall had filled the major reservoirs to flood control reservations. Because of the flood potential from snowmelt, large controlled releases were made for an extended period to gain as much storage as possible to control snowmelt runoff.

Reservoir storage substantially reduced the magnitude of the peak floodflows in many streams. The effectiveness of the reservoirs in reducing these flows is evident in the hydrographs of reservoir operations shown on Plates 25 through 31.

At the close of the 1968-69 water year, storage in 120 of California's major reservoirs was about 19,610,000 acre-feet or approximately 135 percent of the average carryover storage of the last ten years, and about 6,232,000 acre-feet greater than the storage one year ago. Record amounts of carryover storage in surface reservoirs caused reduced ground water pumping requirements so that a general rise in ground water levels occurred in almost all areas of the State.

Beginning with the first intense storm in December and continuing through the critical snowmelt period until the end of June, the Department's Flood Operations Center was either on 24-hour duty or standby alert. Close cooperation among the Department of Water Resources, U. S. Weather Bureau, U. S. Bureau of Reclamation, U. S. Army Corps of Engineers, and local irrigation districts during the critical snowmelt period helped prevent a major snowmelt flood.



NORTH COASTAL AREA
PRECIPITATION STATION LOCATION
AND
JANUARY 1969 STORM ISOHYETAL MAP

North Coastal Hydrographic Area

The North Coastal area extends 270 miles along the coast from the California-Oregon line south to the northern boundary of Lagunitas Creek Basin in Marin County. It ranges in width from 180 miles at the Oregon boundary to 30 miles in the southern portion.

Storms are more frequent, and monthly precipitation is higher in parts of the North Coastal area than in any of the other six major hydrographic areas of the State. Runoff from the area is derived largely from rainfall,with only a relatively small portion contributed by snowmelt.

Early in the water year, seasonal precipitation amounts had lagged in the area as a result of two consecutive subnormal rainfall months. However, a wet December and January brought precipitation totals well above normal. The series of storms that moved across the North Coast in December saturated the drainage basins, but the runoff produced only moderate rises in the streams. All major rivers peaked well below danger or flood stages.

Another series of storms began in the second week of January and continued with intermittent pauses through the month. Precipitation totals during January were well above normal in all the North Coastal basins. The amounts varied from 150 percent of normal in the Smith River drainage to 210 percent in the Russian River Basin. During the period October 1 through January 31, the wettest spot in California was at the Honeydew precipitation station in the Mattole River drainage of Humboldt County. The amount recorded was 85.65 inches, of which 34.93 inches fell in January.

Runoff during the January storms averaged 290 percent of normal in five major North Coastal basin streams. Sharp rises occurred in all the streams, and flooding occurred in the lowlands of the Eel, Van Duzen, and Russian Rivers.

Smith River Basin

The Smith River drains an area of 718 square miles, of which 87 square miles are in the State of Oregon. Mountains and foothills, which are almost entirely below 3,000 feet, comprise 704 square miles.

During a series of storms in January, 19.61 inches of precipitation fell at the Elk Valley precipitation station; 18.29 inches were recorded at Crescent City 1N, and 20.02 inches at Gasquet Ranger Station. The January 9-15 storm caused the season's peak stage of 27.3 feet in the Smith River near Crescent City. (Flood stage is 35 feet.)

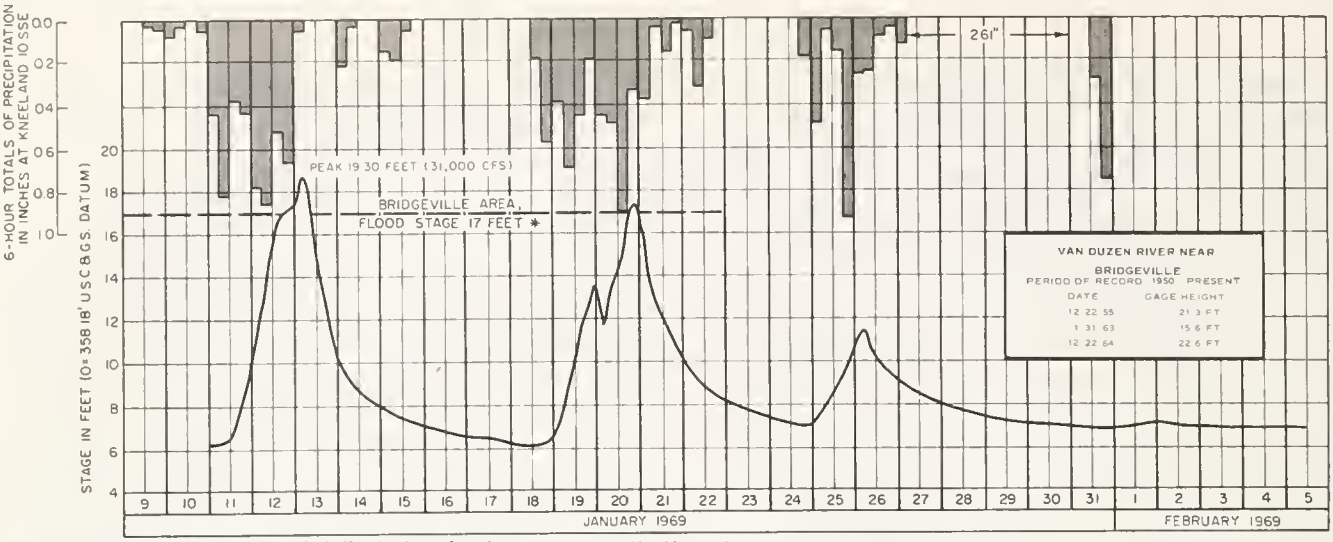
Klamath River Basin

The Klamath River Basin includes the Shasta, Scott, Salmon, and Trinity Rivers. The basins include an area of 15,715 square miles, of which 5,695 square miles are in Oregon.

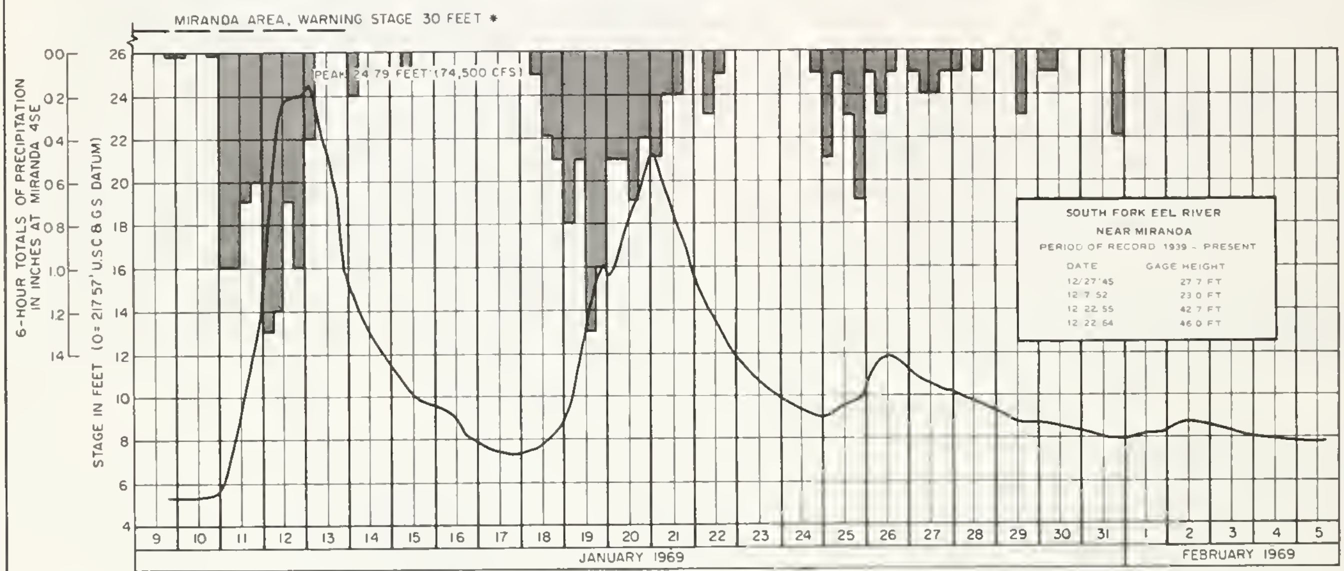
Some typical rainfall totals in the basin during January were: 18.03 inches at Idlewild Highway Maintenance Station; 20.02 inches at Gasquet Ranger Station; and 22.80 inches at Klamath.

The January storms produced two moderate rises on the Klamath River. On January 13, the Klamath River near Klamath crested at 23.4 feet, and on January 21 it reached the seasonal peak stage of 26.9 feet. Flood stage at this location is 33 feet.

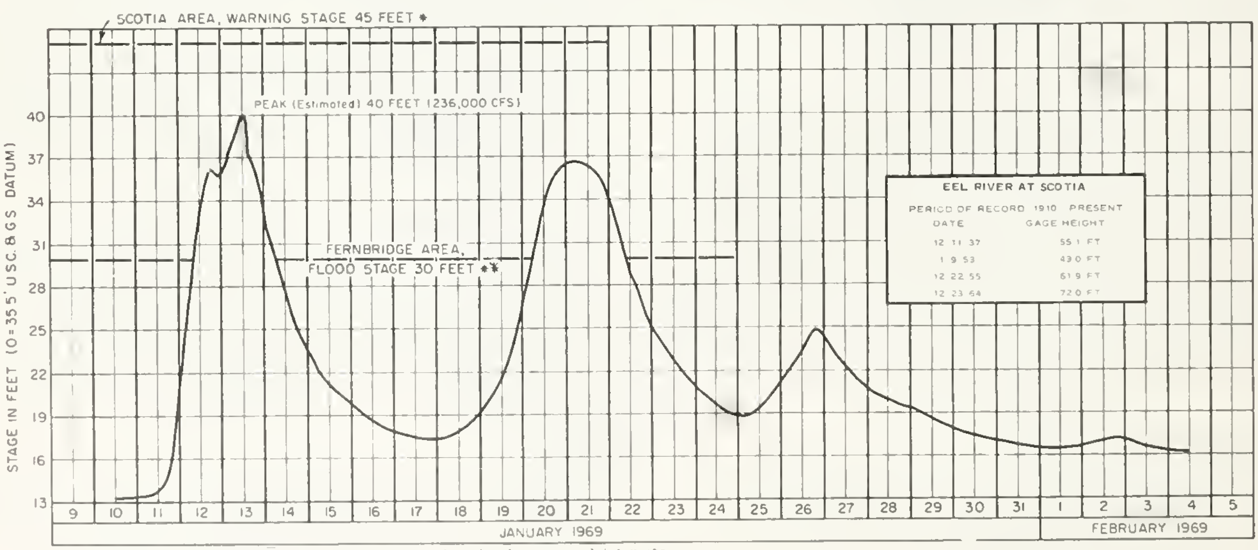
On the Trinity River near Hoopa, a crest of 34.7 feet occurred on January 13, and the season's peak stage of 36.2 feet



* The stage at which overbank flow in the nonleveed stream causes considerable inundation.



* The stage at which initial flood alert action must be taken by concerned interests.



* The stage at which initial flood alert action must be taken by concerned interests.
** The stage at which overbank flow in the nonleveed stream causes considerable inundation.

HYDROGRAPHS OF VAN DUZEN, SOUTH FORK EEL AND EEL RIVERS

occurred on January 21. The flood stage at Hoopa is 48 feet. The season's peak flows in all the Klamath River Basin streams were below flood stage.

Mad River Basin

The Mad River drains an area of 496 square miles. The basin is long and narrow, extending inland south easterly. Only 17 square miles is classified as valley land, with the remainder in foothills and mountains extending to a maximum elevation of 6,000 feet.

Rainfall totals in the basin during January were moderately high. At the Mad River Ranger Station (elev. 2,775 feet), 7.68 inches of precipitation fell during January 10-14, with a total of 19.62 inches for the month.

Ruth Reservoir, on the Mad River, reached its season's maximum storage of 61,200 acre-feet on January 13. On the same day the mean daily spill and release reached a peak of 8,040 cfs; downstream at Arcata, the Mad River crested at 18.55 feet. During the second storm period, January 18-23, a peak flow of 7,720 cfs was released on January 20 from Ruth Dam, and the peak stage of the Mad River at Arcata was 18.7 feet on the same day. The peak flows in the Mad River were well below the flood stage of 24 feet at Arcata. No flooding occurred in any area along the stream.

Redwood Creek Basin

Redwood Creek drains a long, narrow basin of 279 square miles that extends 55 miles southeastward from the coast. The basin's topography is almost entirely mountainous with a maximum elevation of 4,600 feet. Sharp rises occur in Redwood Creek almost immediately following intense rainfall over the basin.

A series of storms in January caused two sharp rises in Redwood Creek. From January 9-15, 4.37 inches of precipitation occurred at Korbel precipitation station. Redwood Creek at Orick reached a peak stage of 14.1 feet on January 13. Precipitation again began falling over the basin on January 18 and intensified on January 19 and 20. Redwood Creek reached a stage of 13.5 feet on January 21.

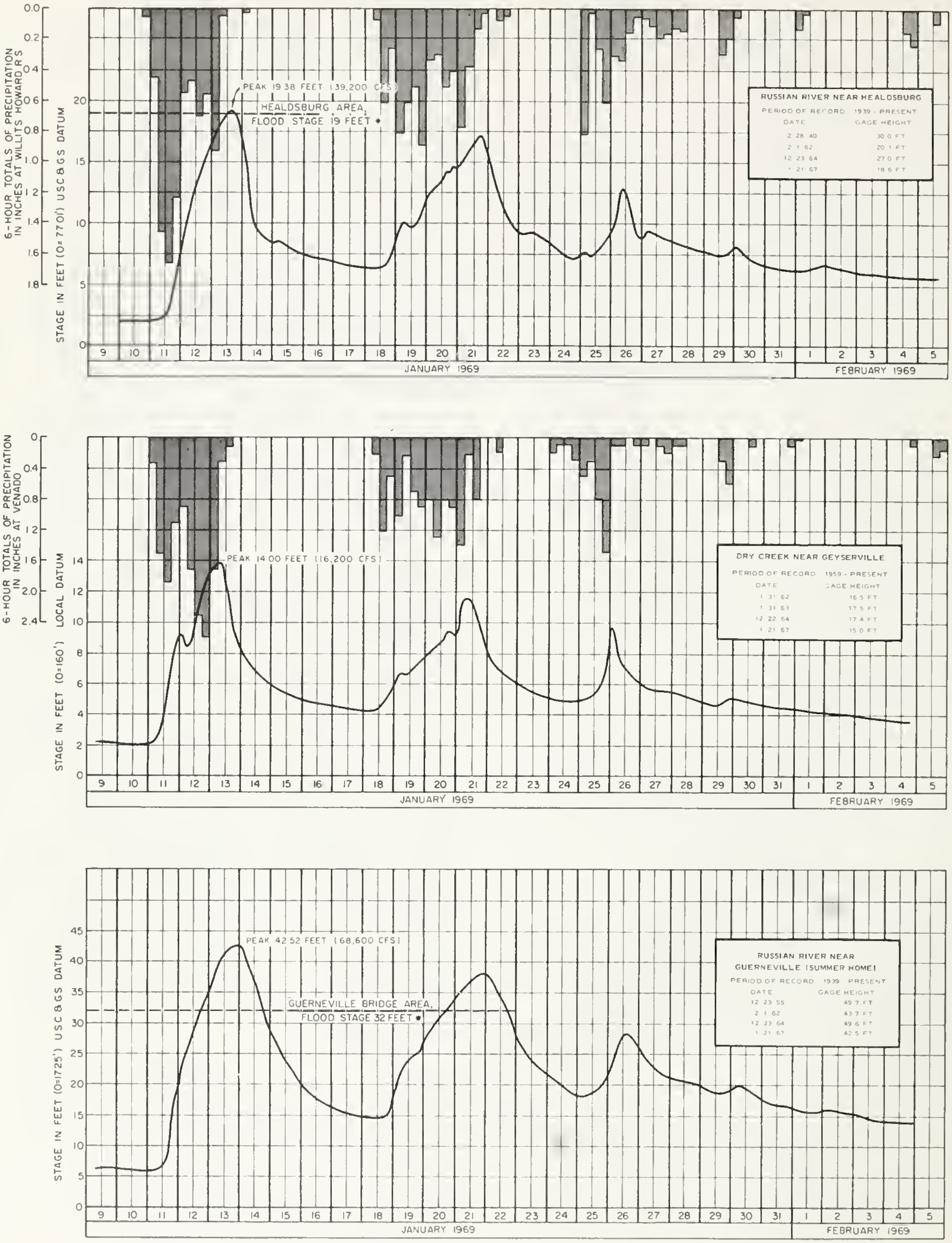
There was no flooding in the basin as the runoff from both storms crested below the 19-foot flood stage at Orick.

Eel River

The Eel River and its principal tributary, the Van Duzen River, drain an inland basin of 3,700 square miles. Of this 3,570 square miles are classified as foothills and mountains that are rough and heavily wooded. The main drainage is northwestward, and the mouth of the Eel River is 13 miles south of Eureka. The Van Duzen River drains an area north and east of the Eel River and flows into the Eel River 14 miles above its mouth.

Light precipitation over the area on January 9 intensified on the 12th and 13th and caused the season's peak flows in the basin streams. On January 13, the south fork of the Eel River near Miranda reached a peak stage of 24.8 feet, and the Eel River at Scotia peaked at 37.9 feet. No flooding occurred at Miranda or Scotia, but a stage of 30 feet at Scotia caused overflow in the Fernbridge area in the Eel River Delta. Flooding occurred over the delta lowlands on January 12 and 13 and again between January 20-23. Overflow spread over farmlands near the river from Fernbridge to the mouth of the Eel River. Roads in the delta became flooded, isolating farms and homes. Dairymen moved their livestock to high ground as flood water covered pastures and feed lots.

On January 13, the Van Duzen River near Bridgeville reached the season's peak stage of 19.3 feet. The flood stage in the Bridgeville area is 17 feet, and flooding occurred in the community of Starvation Flat. Residents of the Starvation Flat area were evacuated by



* The stage at which overbank flow in the nonleveed stream causes considerable inundation.

HYDROGRAPHS OF RUSSIAN RIVER AND DRY CREEK

county officials on January 12 and again on January 20, when a second series of storms caused the Van Duzen River to crest at 17.9 feet. Although no homes in the community were inundated, residents were evacuated as a precautionary measure because the roads in the area were impassable.

Flooding in the basin generally caused considerable inconvenience but the flood damage was relatively minor. Humboldt County was declared a disaster area; however, most of the loss came from storm damage such as slides and slipouts on the state and county roads.

Plate 10 delineates stages of the Van Duzen and Eel Rivers during the January storms.

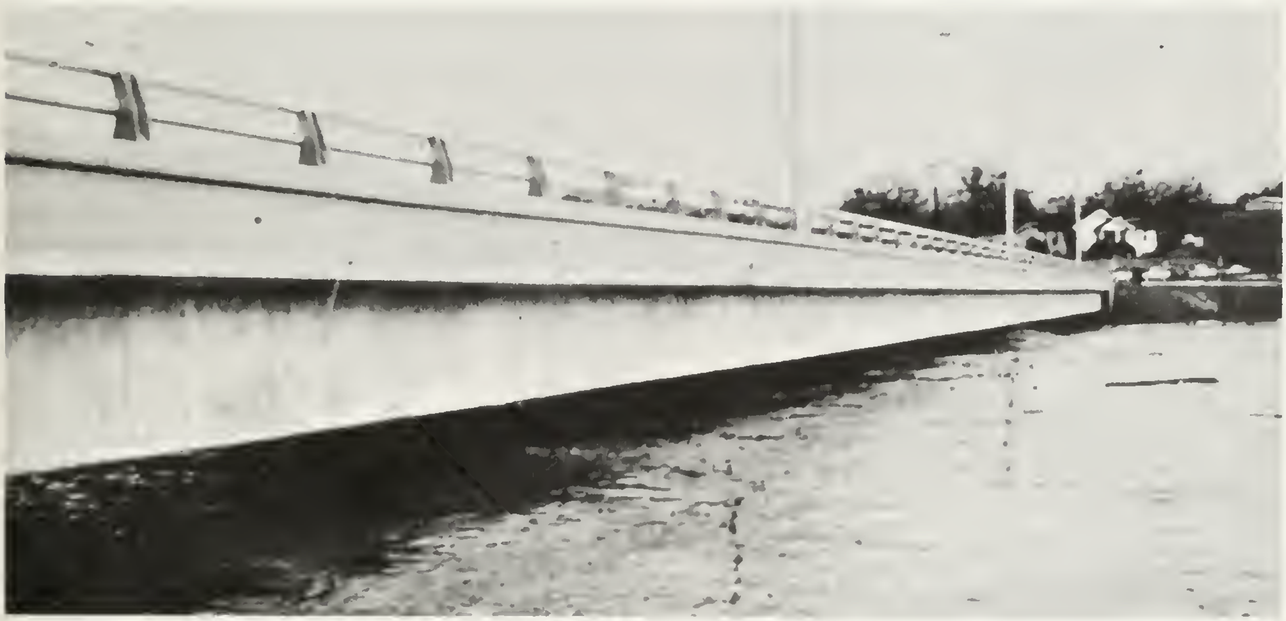
Russian River Basin

The Russian River Basin covers 1,498 square miles and extends 82 miles in length. In the basin, 1252 square miles are classified as mountains and foothills in which the topography is quite rough.

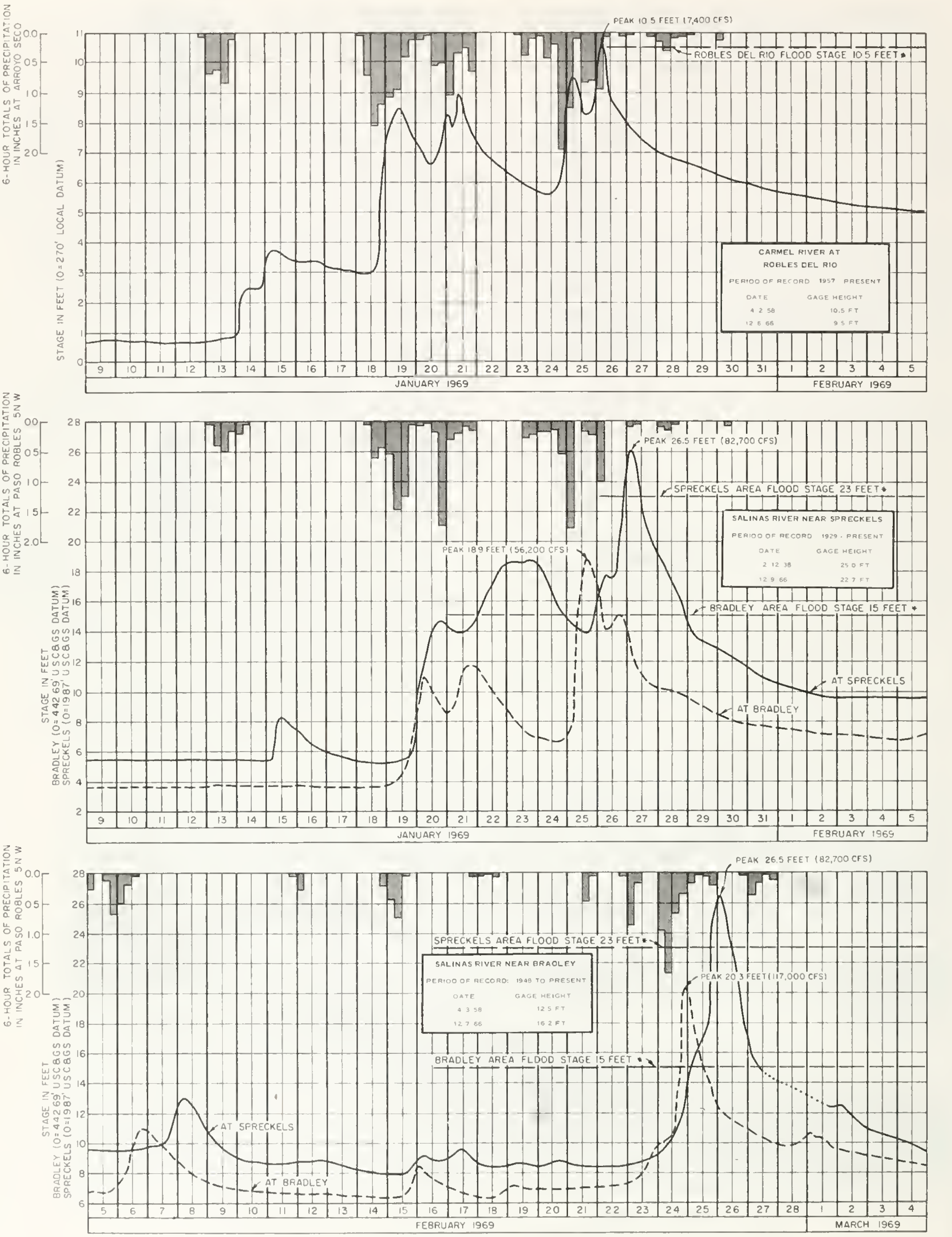
A series of storms in January caused two periods of flooding on the Russian River near Guerneville. The first occurred on January 12-14 and was due to rainfall that averaged about eight inches. Moderate rainfall amounts occurred in the headwater and the Santa Rosa Basins. The precipitation in the Guerneville, Venado, and Healdsburg areas was heavy, and the flow from these basins crested at Healdsburg before the crest arrived from upstream. As a result, the flooding was moderate and confined to the southern portion of the river. The Russian River near Guerneville reached its peak stage for the season of 42.5 feet on January 14; flood stage near Guerneville is 32 feet.

During the second flood on January 20-22, the average rainfall and distribution were similar to that during the first flood, and the Russian River near Guerneville crested at 38.1 feet on January 21.

The Russian River overflowed its banks in the summer resort areas around Guerneville and Rio Nido. High water closed secondary roads in the Guerneville, Hopland, and Geyserville areas, temporarily isolating over 125 persons. However, only relatively minor damage resulted from the two floods. Flow stages of the Russian River at Healdsburg and Guerneville, and Dry Creek near Geyserville are delineated on Plate 11.



High river flows threatened numerous bridges throughout California.
Photograph - courtesy Monterey County Flood Control and Water Conservation District.



* The stage at which overbank flow in the nonleveed stream causes considerable inundation.

HYDROGRAPHS OF CARMEL AND SALINAS RIVERS

Central Coastal Hydrographic Area

The principal streams of the Central Coastal Basin are the Pajaro, Salinas, Santa Maria, and Santa Ynez Rivers, which drain the larger basins. Two-fifths of the area lies within the basin of Salinas River and its tributaries. The Salinas River Basin, about 170 miles long, approximately parallels the coast, from which it is separated by the Santa Lucia Range. The largest valley areas lie in portions of the Salinas, Santa Maria, and Santa Ynez River Basins.

Precipitation on the Central Coastal area is usually moderate, except in a few isolated sections, and decreases from north to south. Extended periods of precipitation during January and February 1969, produced flows in the Salinas and Santa Ynez Rivers that exceeded any prior peak flows of record. These flows may have approached the magnitude of the legendary floods of 1861-62. Widespread and extensive flood damage occurred in the area.

Salinas River Basin

The Salinas River caused severe flooding in Monterey and San Luis Obispo Counties during two consecutive months. The flooding during February was more damaging than in January, which was the worst since 1952. After a four-day storm, which began January 11, the unusually high percolation and infiltration rates of the Salinas River Basin were lowered. The antecedent conditions were favorable for heavy runoff, and precipitation beginning on January 18 caused a rapid rise in the Salinas River and its tributaries.

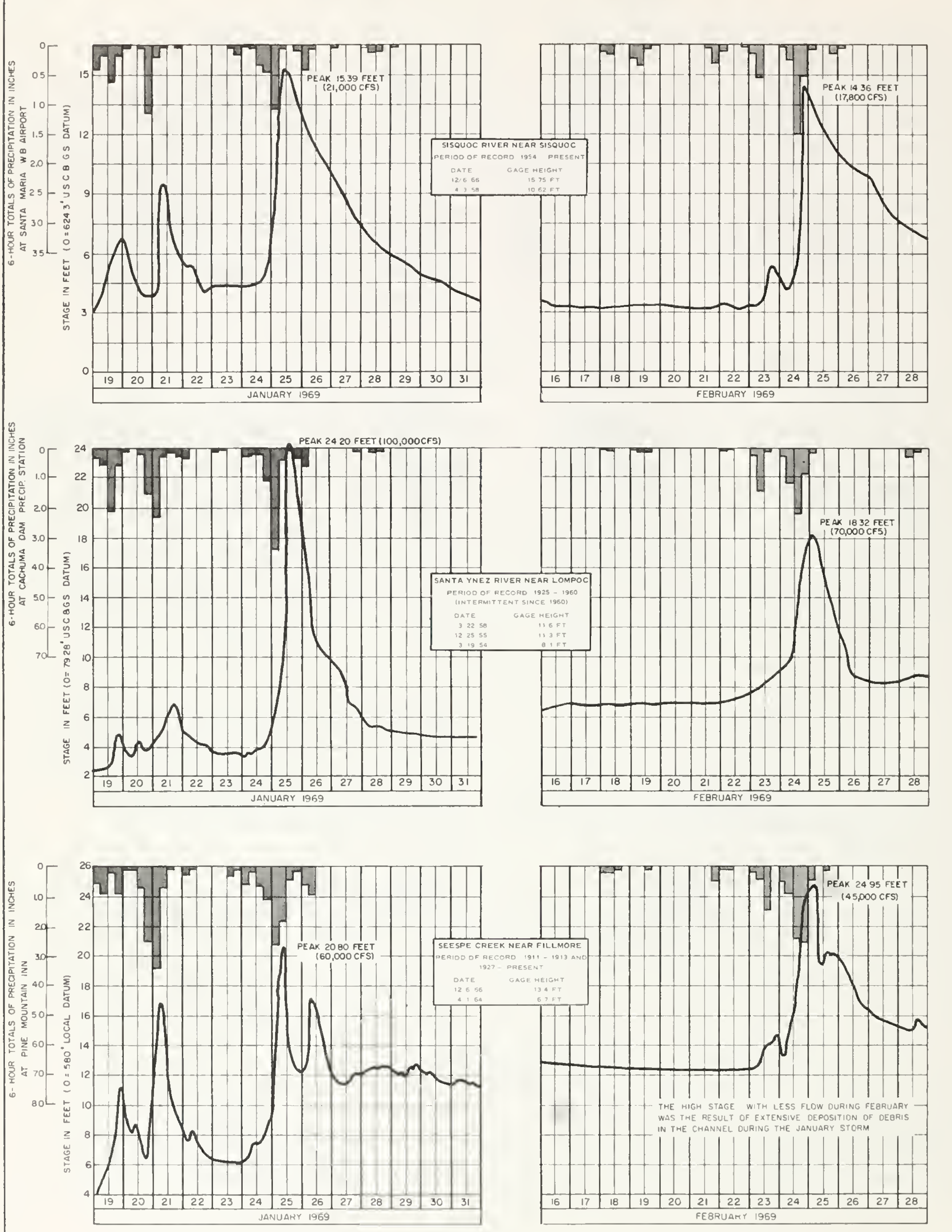
The January flooding was due to heavy rain over the headwaters of the Salinas River during the afternoon of the 24th. In San Luis Obispo County, precipitation during the January storm was of a greater magnitude than that of a 100-year storm. In the city of Santa Margarita, $6\frac{1}{2}$ inches of rain fell during a 24-hour period. On January 25, the Salinas River at Bradley crested 3.9 feet above flood stage, and on January 27, the crest was 3.1 feet above flood stage at Spreckels.

Flooding occurred on both sides of the Salinas River, especially in the section from San Ardo to Spreckels. Sewage treatment plants were flooded along the entire length of the stream. Roads were washed out, bridges destroyed, and the overflow caused extensive erosion of farmland. In the city of San Luis Obispo, streets became temporary streams. A foot-deep stream ran through the main street, and damage in the business area was heavy. Northbound lanes of U. S. Highway 101 were closed by flooding along nearby Shell Beach. Scenic California 1 along the coast was closed because of land and rock slides north of San Simeon. To the south, Pismo Beach had relatively moderate flooding, mostly in the area where Pismo Creek empties into the Pacific Ocean.

In the lower basin, families living along the Carmel River were evacuated when the stream overflowed its banks. Six miles from the coast, the Robinson Canyon Road Bridge over the Carmel River collapsed and temporily stranded thirty persons.

The rainfall that caused the February flood was the heaviest in the basin upstream from King City. The city of Santa Margarita reported 8.42 inches of precipitation from February 21-26; Paso Robles reported 5.10 inches; and Slainas 2.74 inches. On February 24, the peak flow of the Salinas River at Bradley was almost double the January peak flow. The peak stage at Bradley was 20.3 feet; 5.3 feet above flood stage. On the tributaries east of Paso Robles, the flows were higher than during January. Flash flooding was also reported on some of the west side tributaries from

PLATE 13



HYDROGRAPHS OF SISQUOC AND SANTA YNEZ RIVERS, AND SESPE CREEK

Lockwood to Santa Margarita. There was some new flooding from San Lucas to Spreckels, and extensive flooding from Spreckels to the ocean. On February 26, the Salinas River at Spreckels reached a peak stage of 26.5 feet, 2.7 feet higher than the January flood, and 3.5 feet above flood stage.

The damage during the February flood was difficult to assess because the Flood damage during the previous month was so extensive. There was considerable new flood damage in two areas. A large percentage of the total damage during February was in the sector from Spreckels westward to the ocean, where there was practically no damage during January. The other sector was from San Lucas to beyond Paso Robles, where the flooding during February was more extensive than during January.

The Salinas Reservoir on Salinas River, Nacimiento Reservoir on Nacimiento River, and San Antonio Reservoir on San Antonio River provided substantial flow regulation in the Salinas River Basin. San Antonio Reservoir stored all inflow, 188,800 acre-feet during January 18 to March 7, and no releases were made during the flood period. Nacimiento Reservoir increased its storage 314,400 acre-feet from January 15 to February 26. Salinas Reservoir was filled in January and February and spill occurred during each storm period.

Plate 12 delineates the stages of the Salinas River at Spreckels and Bradley during the January and February floods, and the Carmel River at Robles del Rio during the January flood.

Santa Ynez River and
Santa Maria River Basins

Raging flood flows during the second wettest January in 101 years caused severe damage in Santa Barbara County. In the City of Santa Barbara, the total rainfall for the month of January was 15.55 inches, the greatest amount for the month of January since 1916. At Juncal Dam, elevation 2,075 feet, 45.40 inches of precipitation was reported.

The January storm and subsequent flows from Gibraltar Dam and Juncal Dam on the Santa Ynez River quickly filled Cachuma Reservoir. On the morning of January 25, Cachuma Dam spilled for the fourth time since it was built in 1953. A peak discharge of 100,000 cfs in Santa Ynez River near Lompoc occurred on January 25 during the peak spill at Cachuma Dam. Three miles downstream from the dam, the river was flowing within a few inches of the top of the arches of the San Lucas highway bridge. Further downstream in the Lompoc and Solvong area, flood damage was extensive.

The swollen Santa Ynez River damaged roads and bridges, and inundated 4,000 acres of prime agricultural land in the lower valley. National Guard, Marines, and Coast Guard personnel assisted in an airlift evacuation of residents near the Santa Ynez River. South Vandenberg was virtually isolated; as far as the eye could see, one large lake seemingly covered the lower valley. Vandenberg Air Force Base suffered extensive damage as buildings and equipment were inundated. Highways and railroad lines into the base were severely damaged. The remnants of a collapsed bridge linking North and South Vandenberg at Surf were removed with explosives. The demolition was necessary because of the debris which had collected behind the demolished bridge, threatening additional flooding.

In the southern section of Santa Barbara County, heavy flood damage occurred in Montecito and Carpinteria. Small streams such as Santa Monica, Franklin, and San Ysidro Creeks overflowed through residential areas causing heavy sedimentation.

In northern Santa Barbara County, the Santa Maria River at Guadalupe had a peak flow on January 25 of 24,300 cfs, 67 percent of the record peak flow in 1952. Sisquoc River near Sisquoc, tributary to the Santa Maria River, had a

peak flow on the same date of 21,400 cfs. The levees on the Santa Maria River, protecting the City of Santa Maria, prevented flooding that could have caused extensive damage. The levees kept the high flows within the river channel to the Guadalupe Bridge. West of the bridge, the river overflowed its channel inundating lowlands.

Heavy precipitation occurred February 22-25 in the same areas throughout Santa Barbara County that were hard hit in January and caused recurrence of flooding. In the Santa Maria River Basin, Twitchell Reservoir on the Cuyama River filled February 25 and spilled for the first time since completion in 1959. Downstream in Santa Maria River at Guadalupe the peak flow reached 27,200 cfs, exceeding the January flow. Overflow from the Santa Maria River flooded 200 acres of cropland west of Guadalupe to a depth of 2-3 feet.

Many smaller streams in the basins, such as Soloman Creek, Green Canyon, and San Antonio Creek had excessive flows which caused erosion damage to dikes and channels as well as overflowing onto croplands. The City of Santa Barbara escaped serious flooding, although Mission and Sycamore Creeks briefly overflowed their banks.

Plate 13 delineates the stages of the Sisquoc and Santa Ynez Rivers during the January and February 1969 floods.

Gibraltar Dam on Santa Ynez River
Photograph -courtesy of Santa Barbara County Flood Control and Water Conservation District.

South Coastal Hydrographic Area

The South Coastal Basin extends 200 miles along the Pacific Ocean with a maximum width of 75 miles. It comprises all basins draining into the ocean between the southeastern boundary of Ricon Creek Basin in Ventura County and the California-Mexico boundary. Principal streams of the area are the Santa Clara, Los Angeles, San Gabriel, Santa Ana, Santa Margarita, San Luis Rey, San Dieguito, San Diego, and Tia Juana Rivers. Shorter streams draining the coastal slopes are Ventura, Sweetwater, and Otay Rivers, and a number of smaller streams. The Santa Ana River Basin is the largest drainage basin, occupying nearly one-fourth of the South Coastal area.

The most severe flood since 1938 occurred in Southern California due to excessively heavy rain on January 18 through the 26. The precipitation averaged from 10 to 15 inches in the lowlands and from 30 to 35 inches over the mountain areas. The greatest amounts in excess of 45 inches occurred at Opid's Camp and at Mt. Baldy, both in the San Gabriel Mountains. The 1938 storm was a higher intensity, shorter duration storm, but the 1969 precipitation totals are the greatest on record. Near record flows occurred in most channels, and a few exceeded previous records.

Only minor flooding occurred in San Diego County, where the rain was beneficial in restoring underground water levels. Property damage was extensive in Ventura, Los Angeles, Orange, San Bernardino, and Riverside Counties. Damage resulted from erosion in canyons, mudslides in foothill communities, and inundation in low flatland areas. Hundreds of homes were damaged or destroyed by mudslides, and several bridges were washed out.

Recurring heavy rains occurred again in Southern California in February. In most areas the February flood damage was much less than in the previous month, since much of the erosion, silting, and inundation had already occurred. However, some areas were harder hit than in January. In the Santa Clara River Valley extensive damage was sustained by the Ventura Marina, and by agriculture and petroleum industry installations along the river. In Los Angeles, San Bernardino, Riverside, and Orange Counties, residents of several foothill communities were evacuated because homes were damaged or destroyed by inundation, erosion, and mudslides

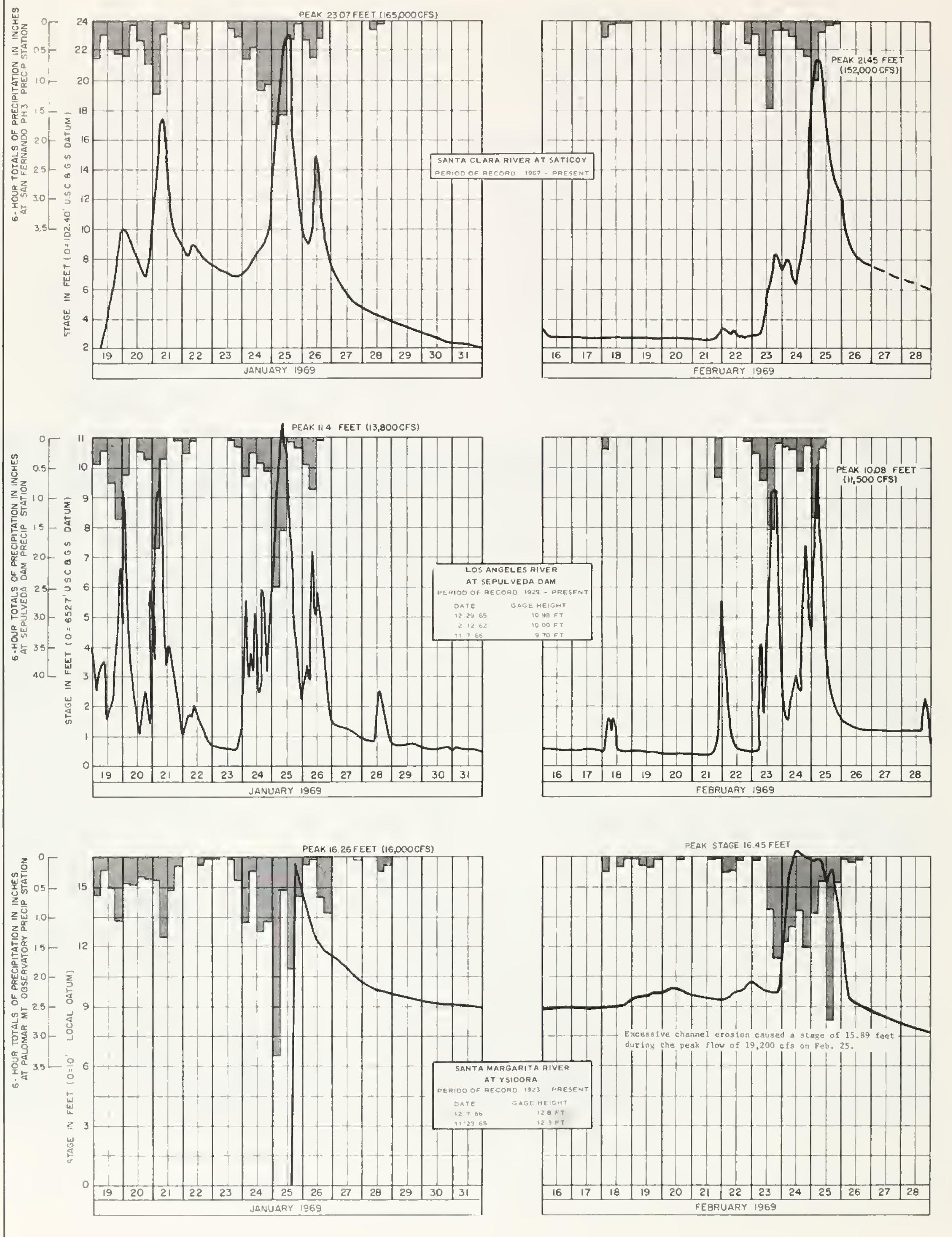
Mudslides were more numerous in Southern California during February than during January. The saturated soil was deluged with an additional 8 to 12 inches of precipitation during February in the lowlands, and 20 to 25 inches in the mountain areas. Rainfall intensities were moderate to heavy. Opids Camp in Ventura County recorded 10.00 inches in a 24-hour period. Streamflows were generally below the January peak flows.

The American Red Cross reported 47 deaths directly attributable to the January and February storms in Southern California.

Santa Clara River and Ventura River Basins

A series of storms swept the basins in January and February. The first storm, January 18-21, was closely followed by a second storm, January 24-27. Both storms carried heavy precipitation amounts accompanied by high intensities. Uninterrupted rainfall over a 12-to 16-hour period during the night of January 25 caused excessive peak flows. On January 25, the Santa Clara River at the Los Angeles-Ventura County line had a record flow of 82,000 cfs; the previous record flow was 34,100 cfs. The peak flood flow in the Santa Clara River at Saticoy, near the mouth, was 165,000 cfs, or 1.4 times the March 1938 record. Sespe Creek

PLATE 14



HYDROGRAPHS OF SANTA CLARA, LOS ANGELES AND SANTA MARGARITA RIVERS

had a peak flow of 60,000 cfs on January 25. This flow was 7 percent greater than the previous record flow of March 1938. Plate 13 shows the January and February 1969 peak stages in Sespe Creek.

The Santa Clara River overflowed its banks and caused serious flooding. Crumbling levees along the river were rapidly repaired to avert the flood danger to the City of Oxnard. In the Santa Paula-Fillmore-Piru area, over 3,000 persons were evacuated. The Ventura River, San Antonio Creek and numerous canyon streams added to the flood damage. Approximately 600 persons were evacuated from communities in the Ojai Valley when streets were flooded with up to two feet of water.

Heavy precipitation occurred February 22-25 throughout the basins and again caused damaging flood flows. The peak flow of the Santa Clara River at Saticoy on February 25 was 152,000 cfs, nearly equal to the January peak. Santa Paula creek near santa Paula had a peak flow that was 1.3 times greater than in January. Emergency repairs to the channels of Ventura River and Santa Paula Creek were necessary during the January flood and also during the February storm. Roads were again inundated and damaged, and numerous bridges washed out.

Reservoirs provided partial regulation in the Ventura River and Santa Clara River Basins. Casitas Reservoir on Coyote Creek, a tributary to Ventura River, stored all inflow between January 17 to February 28, gaining 69,800 acre-feet of water. Lake Piru on Piru Creek, a tributary to the Santa Clara River, contained 25,000 acre-feet of water on January 1. On February 22, Piru Lake reached its maximum capacity of 101,225 acre-feet and spilled for the first time. Matilija Reservoir contained only 500 acre-feet of water prior to the initial January storm. On January 21, the lake reached its capacity and spilled.

Plate 14 shows the peak stages in the Santa Clara, Los Angeles, and Santa Margarita Rivers.

Los Angeles River, San Gabriel River, and Santa Ana River Basins

Heavy rains during the storms of January 18-22 and January 24-27 caused flooding and mudslides in the foothills and canyons of the San Gabriel Mountains.

In Los Angeles County, flood flows occurred in the tributary streams of the San Gabriel and Los Angeles Rivers. Channels were overtopped, bridges, roads, and streets were damaged or destroyed, and thousands of persons were evacuated. Downstream, the Los Angeles River at Long Beach had a record flow of 102,000 cfs on January 25. On the same day, the Arroyo Seco near Pasadena had a peak flow of 8,540 cfs, almost equal to the record peak flow in 1938.

Mudslides added to the flood and storm damage in the communities of Glendale, Highland Park, Encina, Sherman Oaks, Hollywood Hills, Brentwood, Bel-Air, and Verdugo Hills.

Sepulveda Reservoir on Los Angeles River, Hansen Reservoir on Tujunga Creek, and several smaller reservoirs on tributary streams provide flood flow regulation in the Los Angeles River Basin. Combined storage in Sepulveda and Hansen Reservoirs reached 11,890 acre-feet January 25 and 15,960 acre-feet February 25. Peak flows downstream from the reservoirs were substantially reduced and prevented additional flood damage.

In the Santa Ana River Basin, flooding occurred in the upper reaches of the main river and its tributaries. Rampaging streams such as Cucamonga, Deer, Day, and Cajon Creeks severely eroded miles of improved flood channels. In San Bernardino County, roads and bridges were washed out, and the Southern Pacific Railroad and Santa Fe Railroad main lines were damaged. Canyon streams overflowed through residential areas. In the town of Cucamonga about 1,000 persons were evacuated.

High flows in Southern California streams destroyed levees and bridges.

Photographs - courtesy Ventura County Flood Control District.

Flooding was extensive in the canyon areas of the tributaries to the Santa Ana River. Over 1,000 persons were marooned in the Silverado Canyon area as roads were inundated. The flood flows in Santiago Creek eroded its channel and the backyards of several homes, endangering a large residential section.

Streamflows in the Santa Ana River Basin are regulated by Big Bear Lake and Prado Reservoir on the Santa Ana River; Lake Hemet and Railroad Canyon Reservoir on San Jacinto River; and Santiago Reservoir on Santiago Creek. Additional storage and regulation are provided by many other local facilities. Prado Reservoir was empty on January 17, and detained all inflow to reach a peak storage of 73,200 acre-feet on January 29, and 130,100 acre-feet on February 25. Controlled releases were discharged during the storms.

Rainfall during the February 22-25 storm was heavy throughout the area, but the totals were less than those of the January storms, except in the Santa Ana and San Jacinto Mountains. In Little San Gorgonio Creek near Beaumont, Riverside County, the peak flood flow was 12,400 cfs on February 25. The previous maximum flow of record since 1948 was 319 cfs. City Creek near Highland had a peak flow of 7,000 cfs, slightly greater than the record peak of 1938. Santiago Creek at Modjeska, Orange County, had a peak flow of 6,520 cfs, also on February 25. This flow was 2.4 times the January peak. The February peak flows in upstream tributaries of the Los Angeles River exceede those of January.

Santa Margarita River Basin
Southward to Otay River Basin

The principal streams within this area are the Santa Margarita, San Luis Rey, San Dieguito, San Diego, Sweetwater, and Otay Rivers. These streams flow westerly to the Pacific Ocean, draining the coastal basins in San Diego County.

During the January storms, precipitation was county-wide with the heaviest amounts falling in north-county foothills and mountains. Minor flooding occurred only in isolated areas throughout the county.

The most severe storm of the series that swept the area began February 25. Oceanside and Escondido registered precipitation totals of approximately three inches, and nearly two inches of that fell on the first day of the storm. Oceanside Pumping Plant recorded the maximum one-hour amount of 0.75 inch.

In February, storm damage and flooding were reported by the cities of Escondido, Oceanside, and the unincorporated areas of Valley Center, Fallbrook, and Rainbow. In Escondido, flooding occurred from local drainage. In Oceanside, overflow from Loma Alta Creek inundated streets, sections of the business district, and portions of the Hughes Aircraft plant. On San Luis Rey River, a dike broke, flooding an industrial area. A number of roads and bridges were damaged and rendered impassable, and rail traffic was disrupted for a time.

Lake Henshaw on the San Luis Rey River, and Vail Lake on Temecula Creek, a tributary to Santa Margarita River, detained all the inflow during the January and February storms. The combined gain in water stored, 58,490 acre-feet, is approximately one-fourth of the total capacity of the two reservoirs. Sutherland Reservoir on Santa Ysabel Creek, tributary to San Dieguito River, was the fullest it has been since the dam was built in 1954. The City of San Diego's eleven reservoirs held over 193,000 acre-feet of storage at the end of February.

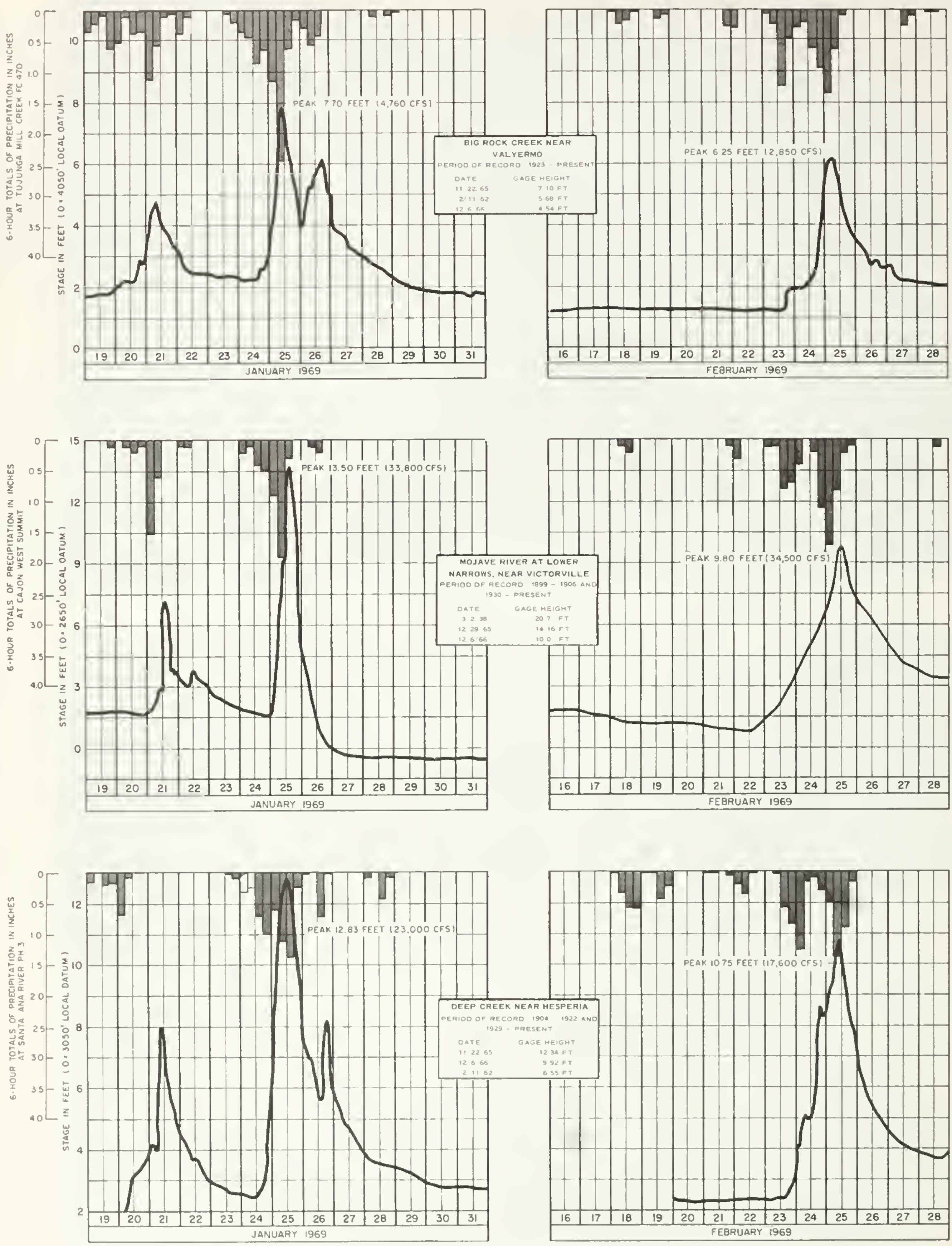
In comparison to the destruction in the Los Angeles area, San Diego County flood damage was relatively light. No injuries or deaths occurred in the county as a result of the storm. Because of the light flood damage, San Diego County was not declared a disaster area.

Raging streams destroyed highways,

Photographs - courtesy Monterey County Flood Control and Water Conservation District.

---railroads, and homes.

Photographs - courtesy Ventura County Flood Control District.



HYDROGRAPHS OF BIG ROCK CREEK, DEEP CREEK AND MOJAVE RIVER

Colorado Desert Area

Although the Colorado Desert area is characteristically arid, it is rimmed by high mountains on the northwest; at the the higher elevations, precipitation is frequently intense. Most of the runoff in the area is derived from the southern portion of the San Bernardino Mountains, from which the Whitewater River drains into the Salton Sea. Several minor streams drain from the San Jacinto and Peninsular Ranges.

Precipitation in the Colorado Desert area was only 80 percent of normal for the period October 1 through February 28. However, a very wet January averaged 220 percent of normal over the area. February precipitation averaged 60 percent of normal over the area, but the extremes varied from 96 percent at Twenty-nine Palms, in the Mojave Desert drainage, to no measurable amount at Blythe FAA Airport.

Whitewater River Basin

Rainfall was heavy during January 18-22 and caused near record flows in the basin streams. The peak discharge in Tahquitz Creek near Palm Springs was 2,900 cfs on January 25. This flow duplicated the maximum discharge of record established November 1965. Snow Creek near White Water, west of Palm Springs, had a peak flow of 13,000 cfs January 25. The previous record flow was 4,200 cfs which occurred November 22, 1965.

Flooding was severe in the Palm Springs area with extensive damage to highways and residential property.

Lahontan Hydrographic Area (Southern Portion)

The principal streams of the area are the Owens River drainage eastern slopes of the Sierra Nevada, and Mojave River draining eastern slopes of the San Bernardino Mountains. Mean seasonal precipitation in the Lahontan area varies from 50 inches in the high altitudes to 1.7 inches in the desert regions.

Precipitation totals in the Mojave River drainage area during the January storms were 45.9 inches at Lake Arrowhead (elevation 5,205 feet), and 5.3 inches at Hesperia (elevation 3,195 feet).

The area affected by flooding was the lower Mojave River Basin.

Mojave River Basin

Precipitation throughout the basin during the January 18-22 storm was generally light and produced only minor runoff. Heavy rains January 24-27, however, caused flood flows comparable to November and December 1965.

In the Mojave River Basin the stream flows of January 25 and 26 were even greater than those in 1965. In Deep Creek near Hesperia the peak discharge of 23,000 cfs was the highest flow since the record peak flow of 46,000 cfs in March 1938. The Mojave at Barstow reached a peak flow of 29,000 cfs on January 25. The highest flows since 1938 reached the lower Mojave River when a peak flow of 18,000 cfs occurred at Afton. This flow caused widespread flooding in the Mojave River lowlands, with water waist deep in areas. Many persons were forced to evacuate their homes, and all bridges and crossings between Victorville and Barstow were impassable.

Heavy rains in the basin mountains February 22-25 caused a recurrence of severe flooding. The West Fork Mojave River near Hesperia had a peak flow of 20,000 cfs, over 150 percent greater than the January peak flow. Flows in the lower Mojave River during February storms were closely comparable to the high flows in January.

The Truckee River damaged bridges --

and flooded private property.

Photographs courtesy of Department of Water Resources Flood Control Project Surveillance Unit.

The principal streams in the area are the Susan River in California, and the Truckee, Carson, and Walker Rivers, which drain interstate watershed basins. The Susan River drains into Honey Lake, which is a closed basin. Considerable agricultural development has taken place in the area, particularly around Honey Lake.

October through April precipitation averaged 120 percent of normal over the Surprise Valley - Honey Lake area, 170 percent of normal over the Tahoe - Truckee area, and 185 percent of normal over the Carson and Walker Rivers' drainage areas.

Very little flood damage was reported in the area except in the Truckee River Basin when relatively high releases were made from Lake Tahoe. Streamflow in the Walker River during the period October 1 through April 30 was 140 percent of normal; the Carson River was 145 percent of normal, and the Truckee River 150 percent of normal.

Truckee River Basin

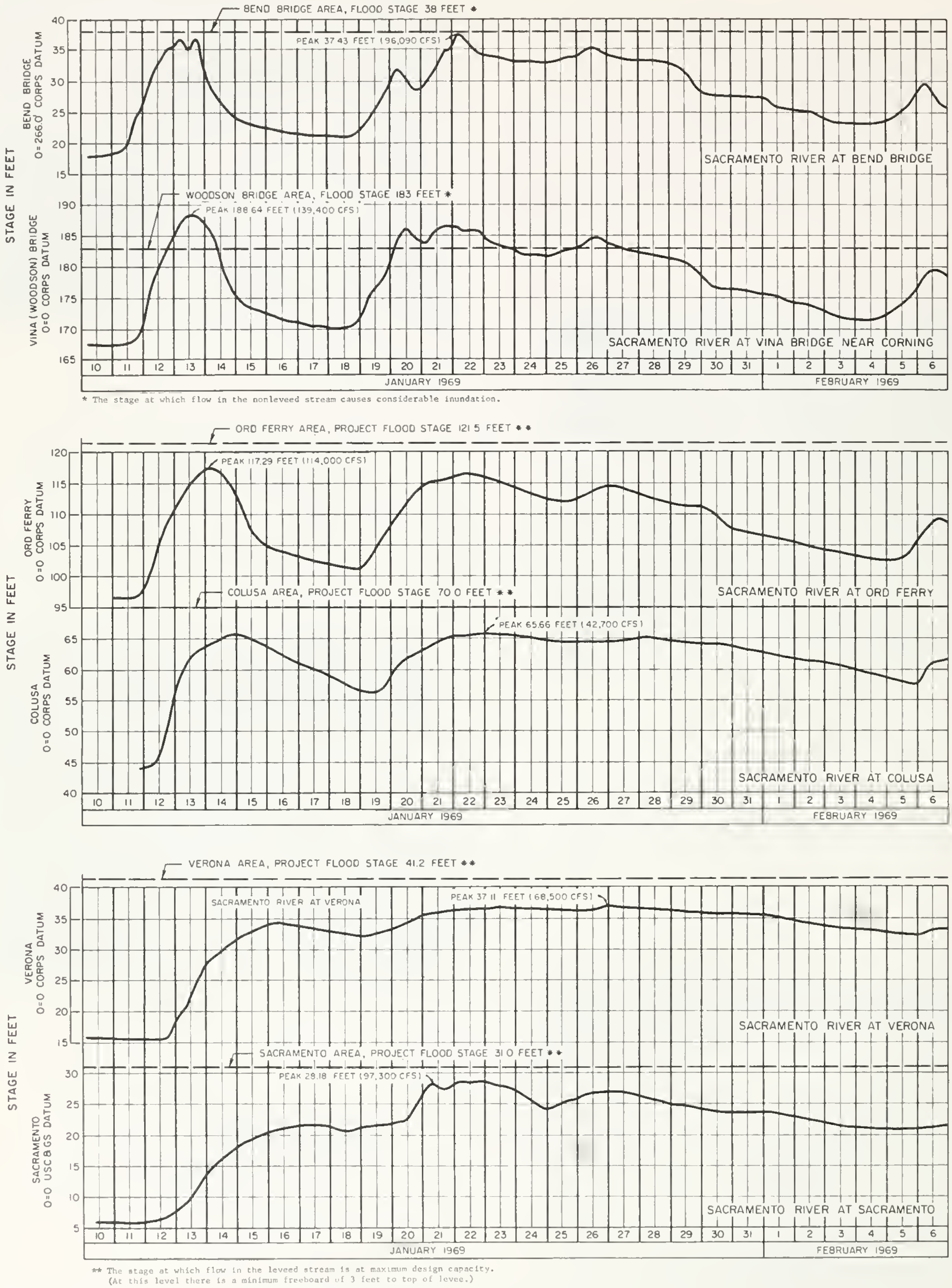
A serious problem developed at Lake Tahoe in June as the lake level continued to rise. The storage in Lake Tahoe is operated under an agreement between the Sierra Pacific Power Company, the Truckee-Carson Irrigation District, the Washoe County Water Conservation District, and the U. S. Bureau of Reclamation. The agreement stipulates (1) that the Lake Tahoe outlet works shall be operated to prevent, insofar as practicable, the water surface of the lake from exceeding elevation 6229.1 feet above mean sea level, and (2) the quantity of water released from the lake shall not cause Floriston rates (Truckee River at Stateline) to be exceeded. Under the existing conditions, Floriston rates provided for 400 cfs in the Truckee River at Floriston.

On April 1, the elevation of the lake was 6227.48 feet. Due to the heavy water content of the deep snowpack in the basin it was estimated the lake would rise 2.9 feet during the snowmelt period assuming outlet gates closed. On June 9 the lake level had rises to elevation 6228.93 feet. Releases of 1,400 cfs were being made but, because of continuing precipitation, the outflow did not stabilize the lake level.

On June 11, twelve outlet gates were open and the release was near 1,700 cfs. This flow did not cause any serious problems downstream. On June 18, the elevation of the lake was 6229.03 feet and the releases were 2,140 cfs. The high flow destroyed several private footbridges across the Truckee River. At noon on June 19 all the outlet gates were opened and the peak flow downstream reached 2,620 cfs, the record peak release from the lake.

One-half mile downstream from the outlet gate, the Granlibakken Bridge at the Tahoe Lumber Company was swept downstream. It was necessary to move stacks of lumber from a storage area that became inundated. Further downstream at the River Ranch it was necessary to anchor a footbridge with cables to keep it from floating off its abutments. Approximately four miles downstream from the lake, severe channel erosion occurred on the right bank. Division of Highway's personnel placed sandbags in the area to prevent damage to Highway 89 and also to protect the sewer line from being exposed.

The lake level dropped to 6229.0 feet by June 21. On June 26 the level was 6228.88 feet with the outlet structure closed except for one gate partially open. No flood damage was reported in the lower reaches of the Truckee River as the flow was not exceptionally high for the channel in that area.



HYDROGRAPHS OF SACRAMENTO RIVER

Central Valley Hydrographic Area

The Central Valley area comprises all stream basins that drain into the Sacramento and San Joaquin Valleys upstream from the point of discharge of the Sacramento River into Suisun Bay between Collinsville and Pittsburg. The area averages 120 miles in width and 500 miles in length.

The principal streams of the Sacramento Valley are the Sacramento River and its main tributaries: the McCloud, Pit, Feather, Yuba, Bear, and American Rivers, which flow from the Sierra Nevada; and Cottonwood, Stony, Cache, and Putah Creeks, which drain from the coastal ranges. The principal streams of the San Joaquin Valley are the San Joaquin River and its principal tributaries: the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, and Merced Rivers, all draining from the Sierra Nevada. The Kings, Kaweah, Tule, and Kern Rivers also drain from the Sierra Nevada, but into Tulare Lake. Some of the flood flows of Kings River are tributary to San Joaquin River by way of Fresno Slough, and in times past, during periods of flood, Tulare Lake has overflowed into the San Joaquin River.

Precipitation in the area decreases progressively from north to south, with heavy snowfall a winter feature of the Sierra Nevada at elevations above 3,000 feet in the northern portion and 4,000 feet in the south.

From October 1, 1968 through April 30, 1969, precipitation over the Sacramento Valley area averaged 145 percent of normal and total runoff was 165 percent of normal. A very wet January approached $2\frac{1}{2}$ times the normal precipitation amounts, and total runoff during the month was 370 percent of normal.

In the San Joaquin Valley, precipitation averaged 355 percent of normal, the wettest January of record. Record January flows occurred in the major streams of this area, with the aggregate runoff exceeding 680 percent of normal. January streamflow totals with respect to normal ranged between 575 percent for the Stanislaus watershed to 1000 percent for the Kaweah River Basin. Levee seepage problems due to the extended period of high river stages, and flood problems due to levee failures, were widespread throughout the San Joaquin River and Tulare Lake Basins.

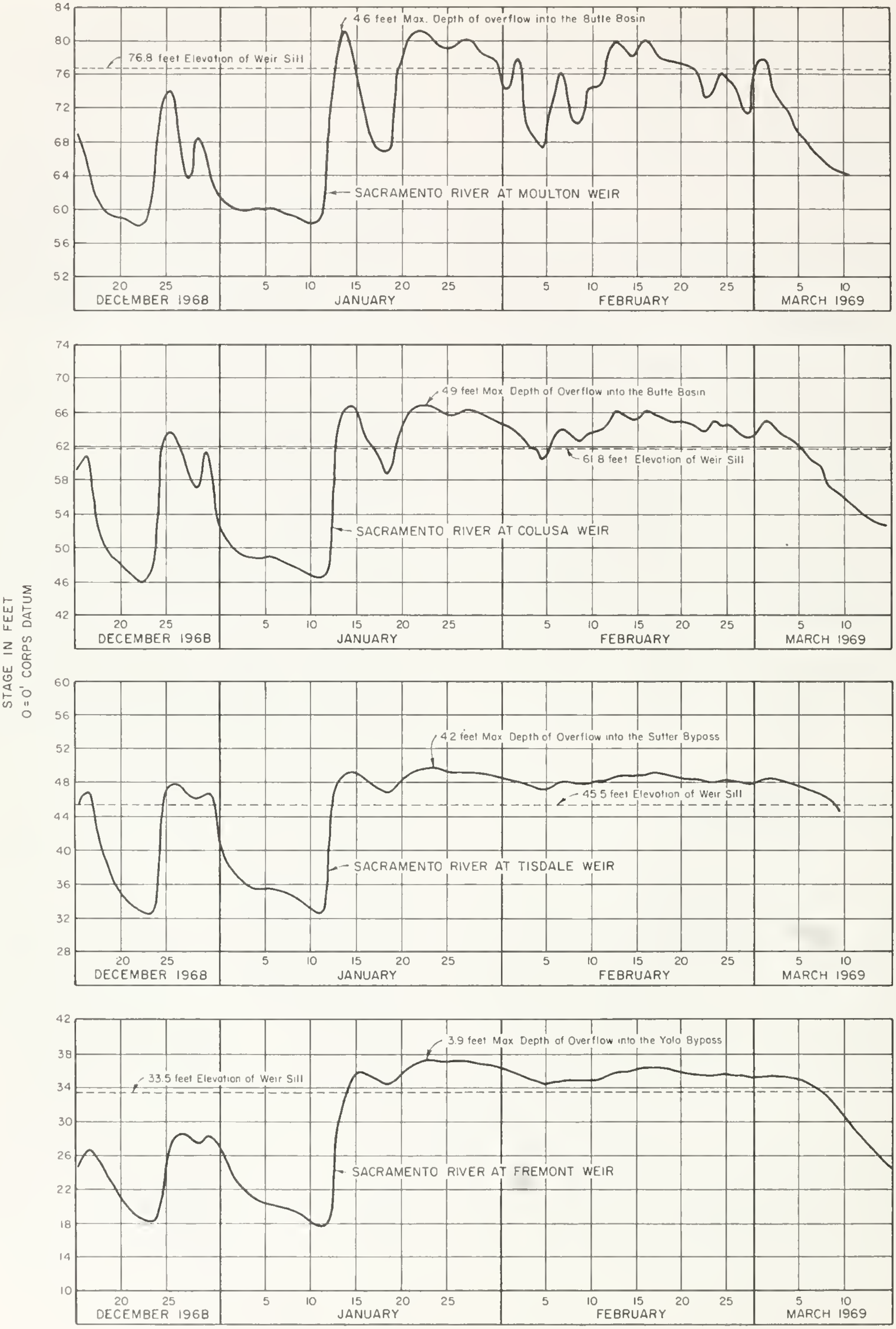
Sacramento River Basin

The first moderate rise of the season in the Sacramento River and its tributaries occurred in December. The rise caused minor overflow into the Sutter Bypass at Tisdale and Colusa Weirs, but danger or warning stages were not reached at any other point along the system. The overflow into the bypass, which is normal during the winter months, was an inconvenience to agricultural interests but did little damage.

A very wet January boosted near-normal precipitation amounts to well above normal. Total runoff in the major streams of the Sacramento Valley during January was 370 percent of normal.

Streams to the south experienced the second highest flows of record and were near 500 percent of normal.

Continuing precipitation in January caused all major reservoirs in the area to encroach upon flood control storage reservations. During the month it was necessary to increase releases from the flood control reservoirs to attain required storage space. On January 20, Folsom Reservoir storage releases through Numbus Dam to the American River were increased from 10,000 cfs to 50,000 cfs, and on January 21 were increased to 70,000 cfs. On January 22, Shasta Reservoir storage releases through Keswick



OVERFLOW AT FIXED-SILL WEIRS ON SACRAMENTO RIVER

Dam to the Sacramento River were increased from 17,000 cfs to 50,000 cfs. Operational release of the first controlled water over the Oroville Dam spillway began on the morning of January 21. On that date, releases were gradually increased to a maximum of 54,000 cfs through the gated spillway and an aggregate of 55,000 cfs from the Oroville complex to the Feather River. The maximum release to the river was maintained for approximately nine hours and then reduced to 40,000 cfs.

Releases from the three major reservoirs were continually adjusted through January, and by the end of the month, Keswick Dam releases had been reduced to 18,000 cfs. Nimbus Dam releases had been reduced to 18,000 cfs, and the total release to the Feather River from the Oroville project had been reduced to 20,000 cfs. Plates 25 and 26 illustrate the operations of Shasta Dam, Folsom Dam, and Oroville Dam.

Five major crests moved down the Sacramento River in January. Warning stages were exceeded at many points, and overflow occurred into the Sutter Bypass and Yolo Bypass at all the flood control project weirs. Plate 17 delineates the overflow which occurred at all the fixed sill weirs, and Plate 18 shows the overflow at the Sacramento Weir.

The Sacramento Weir Unit of the Sacramento River Flood Control Project is a gate-contolled weir. It consists of a fixed sill 2,000 feet long and has 48 bays and gates. When open, it diverts flood waters of both the Sacramento and American Rivers from the main flood channel of the Sacramento River, about three miles upstream from the mouth of the American River into the Yolo Bypass. The objectives of the operation of the Sacramento Weir are to limit flood stages in the Sacramento River between Verona and Isleton to the project flood stage, with maximum feasible utilization of the flood capacity of the Sacramento River channel below the weir.

The Sacramento River in the vicinity of Sacramento began rising slowly on January 12. A sharp rise on January 20 and 21 reached a stage of 28.2 feet, and at 9:15 a.m. on January 21 it was necessary to open 16 gates of the Sacramento Weir. This operation marked the first time since December 1964 that the weir had been opened. All the islands located in the lower end of the Yolo Bypass were flooded by January 23. However, ample warning permitted early evacuation of all livestock and farm equipment from the bypass.

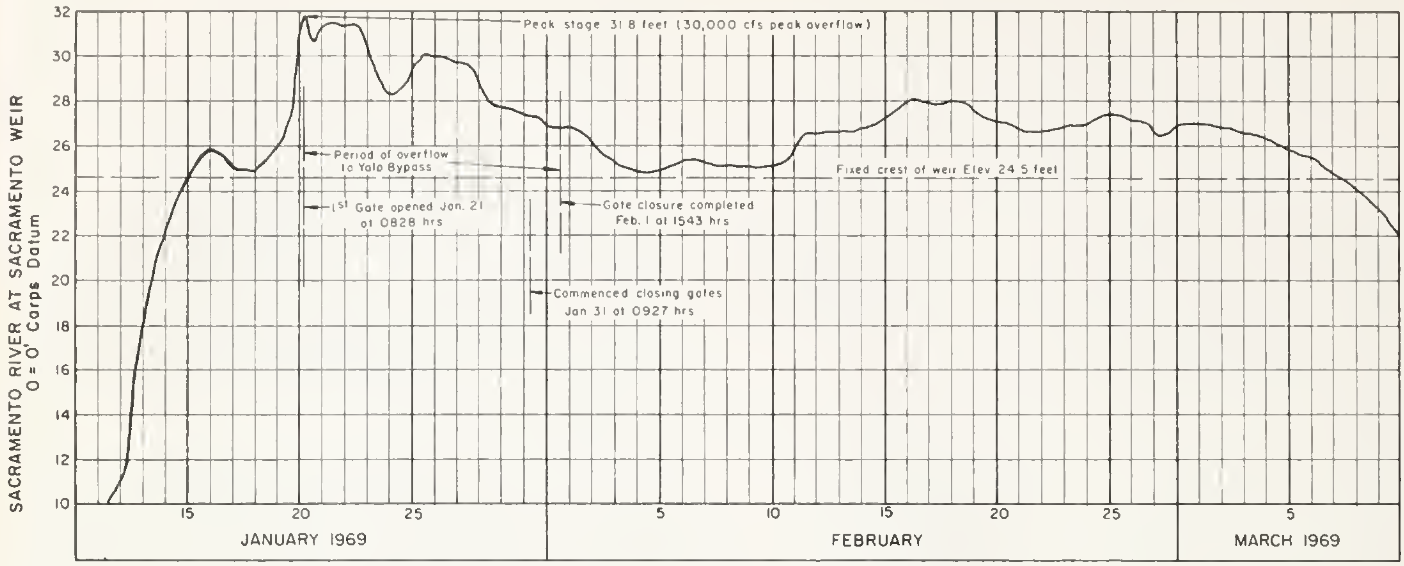
The Sacramento River at Sacramento held steady near 28 feet for three days subsequent to opening the Sacramento Weir and then began to fall slowly. Overflow into the Yolo Bypass at Sacramento Weir continued until February 1. Closure of the Sacramento Weir gates began January 31 and was completed on the afternoon of February 1.

Overflows at the Sacramento Weir and Fremont Weir combined with flows from Putah and Cache Creeks produced an estimated peak flow of 220,000 cfs in the Yolo Bypass near Lisbon. Total peak flow past the latitude of Sacramento, including the Sacramento River and the Yolo Bypass, was estimated to be 317,000 cfs.

The Sutter and Yolo Bypasses of the Sacramento River Flood Control Project effectively bypassed high stages and large volumes of water around highly developed urban, suburban, and agricultural areas. With the exception of some local flooding and storm drainage problems, no serious flood damages were reported in the Sacramento area. Sixty residents of a trailer park were evacuated early on the morning of January 21, when the American River overflowed into the lowlands of the flood plain. Trailer homes were pulled out of the lowland park, which has been inundated many times in the past.

High stages continued into February

PLATE 18



OVERFLOW INTO YOLO BYPASS AT SACRAMENTO WEIR

The Sacramento Weir diverts excess flows in the Sacramento River to the Yolo Bypass.
Photograph - courtesy of Department of Water Resources Graphic Services.

with seven additional crests moving down the Sacramento River. Overflow continued during the entire month at Tisdale and Fremont Weirs. The bypasses remained flooded and normal agricultural operations were impossible. Farming operations were delayed several weeks beyond the usual spring starting time. Plate 16 illustrates the stages of the Sacramento River at various points during the January storms.

Sacramento - San Joaquin Delta

In the Sacramento-San Joaquin Delta area a combination of large inflows and high tides resulted in unusually high water. levels. This, together with strong winds which caused high waves, threatened to overtop and erode the levees in the area. The high-tide stages at Rio Vista were only one-tenth of a foot below the nine-foot flood stage.

Late in the afternoon on January 20 a levee on the San Joaquin River protecting Sherman Island was breached, and the 10,000-acre island was flooded. The island lies just above the confluence of the San Joaquin and Sacramento Rivers. The 200 inhabitants were alerted to the break in time to move heavy farm machinery and livestock to high ground. As the water rose slowly over the island, the residents moved what items of value they could. Within two days the island was completely flooded by 90,000 acre-feet of water which, in places, was 20 feet deep. Most dwellings on the island were destroyed beyond repair.

The break in the Sherman Island levee widened to approximately 200 feet before the U. S. Corps of Engineers arrived with rock-loaded barges and a crane to begin repairs.

Personnel of the Department of Water Resources and Conservation Camp Crews worked round-the-clock on Sherman Island to control wave wash on the land side slopes of the island levees. On February 9, the breach in the levee was closed and work continued to install pumps to dewater the island. It was necessary to continue pumping operations until late in September before the island was completely dewatered and the repair to agricultural lands could commence.

Through January, winds, tides, and high streamflows continued to create a critical situation for the islands in the Delta. Residents of the islands and tracts maintained levee patrols, and continued sandbagging operations as the levees deteriorated from long saturation and wave wash action.

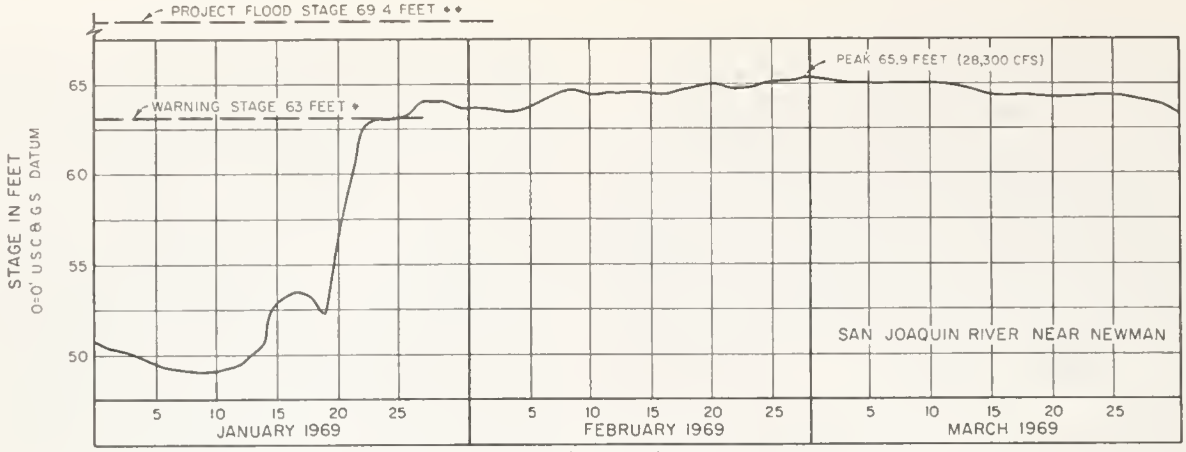
On January 26, the Department increased its surveillance activities throughout the delta, and a mobile-headquarters equipped with radio and telephone communication was established at Brannan Island.

High water continued to cause serious levee problems in the delta during February. On February 15, the levees on Venice Island were overtopped at various locations by almost an inch of water, but sandbagging operations prevented the levees from being breached. On February 16, a levee protecting Mildred Island broke and the 3,000-acre island was flooded. Many other islands in the delta experienced slips and erosion of their levees, and considerable flood fighting activity was required to prevent failures.

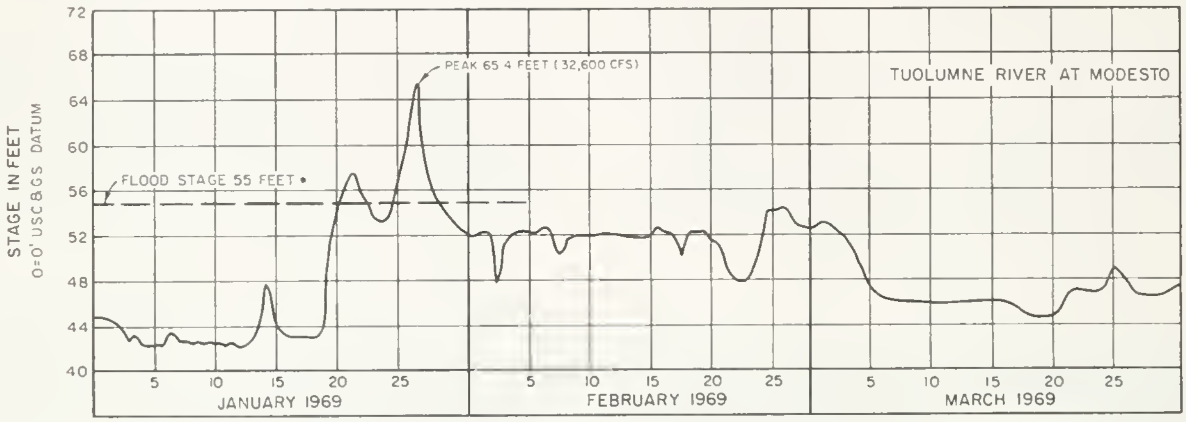
San Joaquin River Basin

Record precipitation in January fell over most of the San Joaquin Basin, particularly south of Yosemite Valley. Some stations reported over 600 percent of January normal, and the entire basin averaged well over 300 percent. During the period January 18-27, several stations reported between 35 to 40 inches of precipitation.

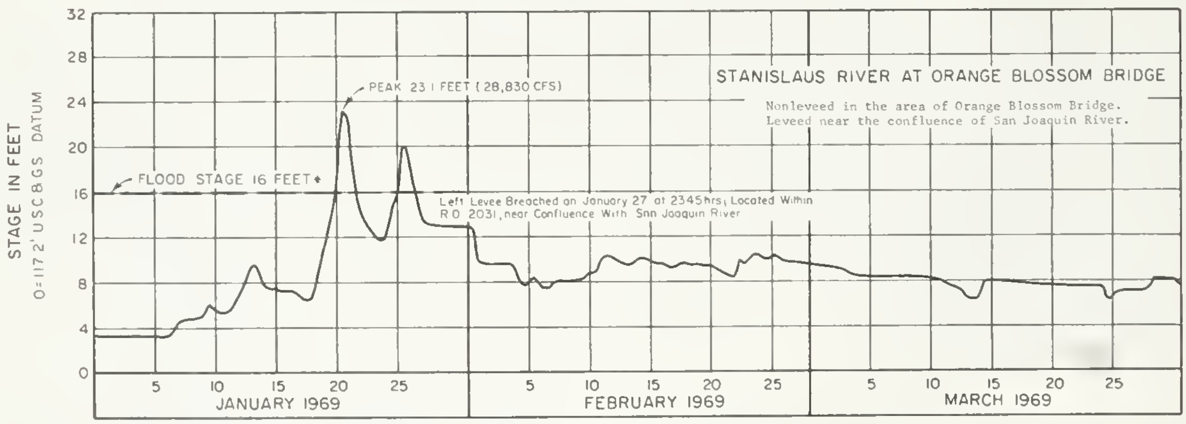
On February 1, 27 major reservoirs serving the San Joaquin Valley contained 3,663,000 acre-feet of water. This storage amounted to 60 percent of the res-



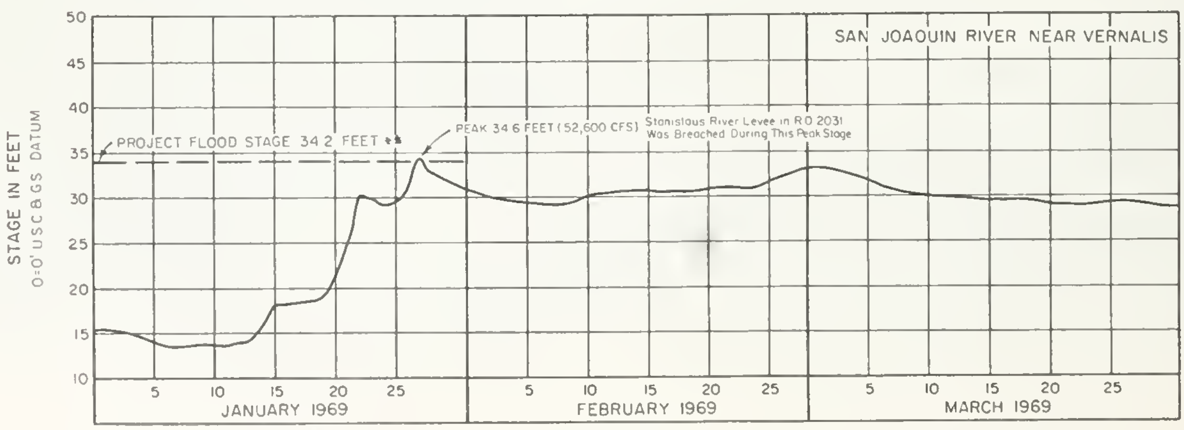
* The stage at which initial flood alert action must be taken by concerned interests.
** The stage at which flow in the leveed stream is at maximum design capacity.



* The stage at which overbank flow in the nonleveed stream causes considerable inundation.



* The stage at which overbank flow in the nonleveed stream causes considerable inundation.



** The stage at which flow in the leveed stream is at maximum design capacity.
(At this level there is a minimum freeboard of 3 feet to top of levee.)

HYDROGRAPHS OF SAN JOAQUIN, TUOLUMNE AND STANISLAUS RIVERS

ervoirs' combined capacity, and was 160 percent of normal February 1 storage. All the major flood control reservoirs in the basin encroached into flood control storage during the late January storm period. Because of this encroachment, high reservoir releases were necessary to attain the required storage space.

Three to five major crests moved down the several tributaries of the San Joaquin River during the January storms. On the lower San Joaquin River, flood warning stages were reached or exceeded at all points, and flood stages were reached at several points. On January 27, near midnight, the San Joaquin River at Vernalis reached a stage of 34.6 feet the highest stage of record for that station. Seepage through the levees was excessive during the high flows, but there were no levee breaks on the San Joaquin River during January.

The record flow in the San Joaquin River combined with high flows in the Stanislaus River to cause a break in the left levee of the Stanislaus River one-half mile above its confluenced with the San Joaquin River. At the time of the break, two Forestry Conservation Camp crews supervised by Department of Water Resources' personnel were conducting a flood fight on the Stanislaus River. The break resulted in flooding of 3,000 acres of agricultural land in Reclamation District 2031. Peak flows in the Stanislaus River occurred January 21, five days before the levee break. These flows caused flooding in and around the City of Ripon.

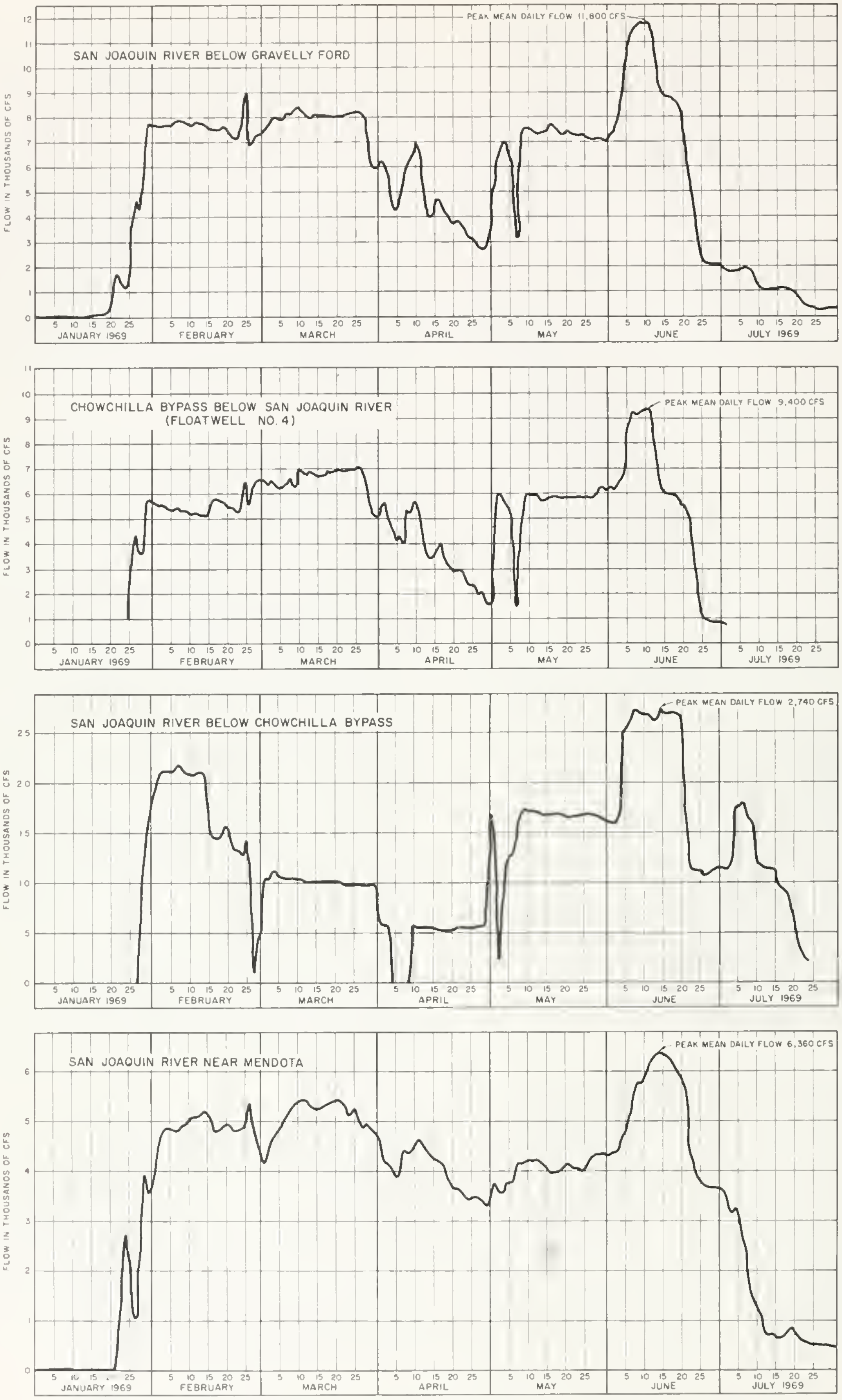
Flood flows moving down the Tuolumne River reached a peak stage of 65.4 feet at Modesto on January 27. Flooding occurred near the town of Modesto along the river, but damage was relatively minor. The flows receded below flood stage by January 29, but high flows continued because of large reservoir releases and snowmelt runoff. In February the Tuolumne River at Modesto again rose above flood stage. From February 25 to February 27, flooding recurred in the areas that had been flooded in January. It was late in June before the Tuolumne River receded to its normal seasonal flow.

In the San Joaquin River drainage basin above Friant Dam, the mean precipitation during the period January 18-29 was over 17 inches. The maximum daily inflow to Friant Reservoir was 18,850 cfs, which occurred on January 25. Releases from Friant Reservoir were steadily increased until February 4, when the peak mean daily release during the rainfall-runoff period was 8,776 cfs.

Another series of storms began February 5 and continued intermittently through the month. The mean monthly precipitation total in the basin was near thirteen inches. The levees on the lower San Joaquin River were gradually deteriorating from the extended saturation, and on February 26 a section of nonproject levee broke on the west side of the San Joaquin River. The break occurred approximately two miles south of the Patterson highway bridge, but the area flooded was not extensive. On February 28 another section of levee failed on the San Joaquin River. This break occurred on the west side, in Reclamation District 2101, near the San Joaquin-Stanislaus County line. Flooding from this break was also relatively minor.

The relatively high releases from Friant Reservoir continued through the February storm periods and were again increased during the snowmelt runoff period. From June 6 to 10, the peak mean daily release was 12,400 cfs.

Downstream from Friant Reservoir, the San Joaquin River at Gravelly Ford reached a peak mean daily flow of 11,800 cfs on June 9 and 11. Farther downstream the peak mean daily flow in the Chowchilla Bypass below San Joaquin River was 9,400 cfs on June 11, and the peak mean daily flow in the San Joaquin River below the Chowchilla Bypass was 2,740 cfs on June 14.



HYDROGRAPHS OF SAN JOAQUIN RIVER AND CHOWCHILLA BYPASS

In the Eastside Bypass near El Nido, the peak flow during the rainfall-runoff period was 21,700 cfs, reached on February 25. The peak flow during the snowmelt-runoff period was 14,700 cfs on June 11.

On the west side of the San Joaquin Valley, the January storm caused a peak flow of 2,420 cfs in Avenal Creek near Avenal on January 25. The peak flow in Los Gatos Creek above Nunez Canyon near Coalinga was 3,930 cfs on January 26. These flows exceeded those that occurred in December 1966 and caused widespread flooding.

In February, heavy rains along the west side of the valley again caused extensive flooding. Warthan Creek overflowed its banks as it came out of the canyon, flooding the main street of Coalinga. South of Coalinga, the south levee of Warthan Creek broke, flooding agricultural land, a bowling alley, and a trailer park. The overflow forced about 80 people to evacuate their homes. Los Gatos Creek overflowed its channel north of Coalinga, causing minor flooding. Roads were flooded and travel in or out of Coalinga was impossible for several hours.

The peak discharge of 2,600 cfs on February 24 in Avenal Creek near Avenal, and 4,360 cfs in Los Gatos Creek above Nunez Canyon near Coalinga, exceeded the peak January flows and are the maximum flows of record for the stations.

The left levee of the Stanislaus River, near the confluence of the San Joaquin River, was breached on January 27, causing inundation of an extended area of farm land.
Photograph - courtesy of Department of Water Resources Flood Control Project Surveillance Unit.

A break in the Sherman Island levee --

-- caused flooding of State Highway 160, and the approach to the Antioch bridge.

Some farm implements were saved from flood damage --

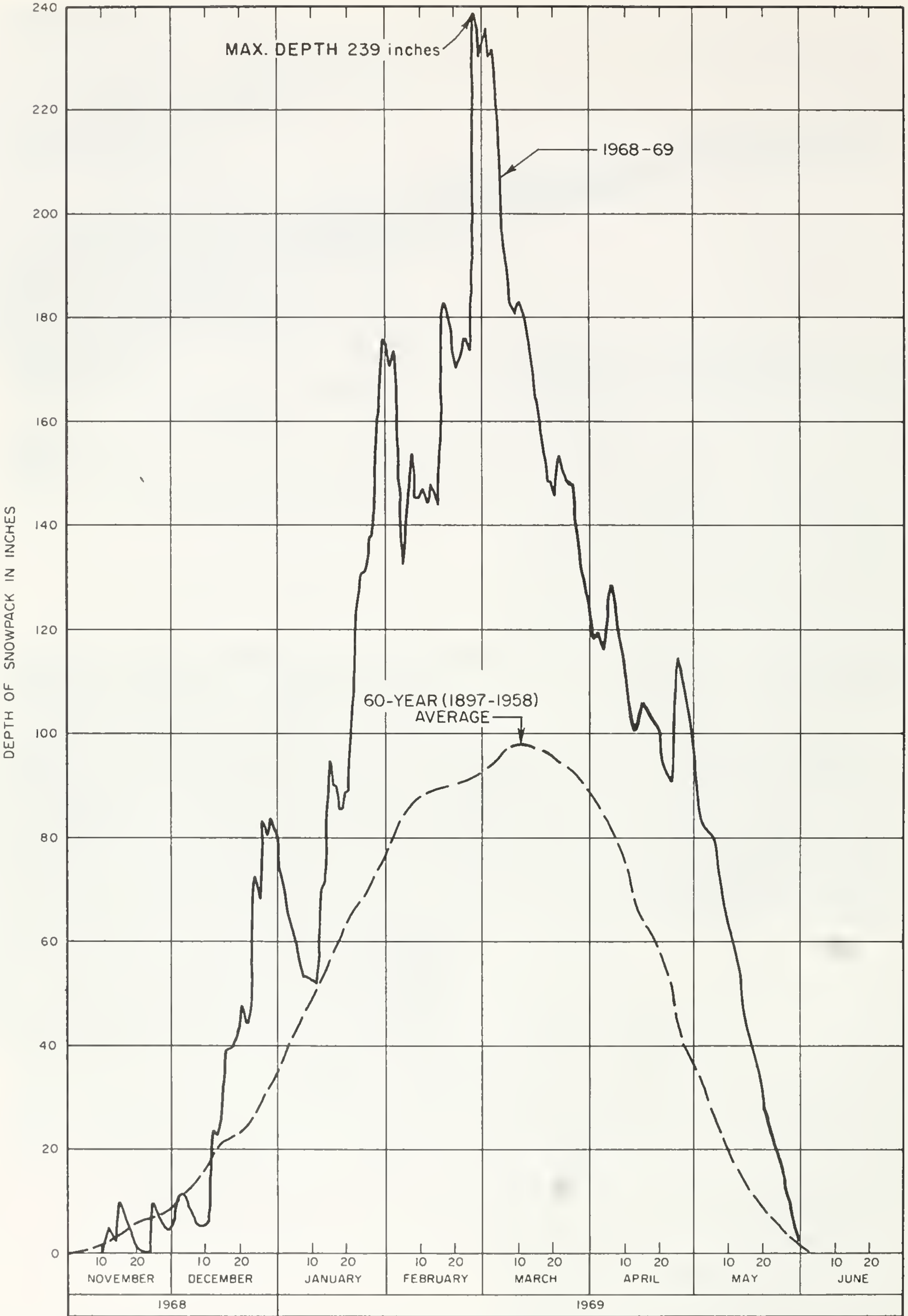
-- but homes and storage sheds were inundated and severely damaged.

Photographs courtesy of Department of Water Resources Graphic Services.

CHECKING THE SNOWPACK--An aerial check of snow courses revealed over twelve feet of snow at Long Meadow on February 1, 1969. This snow course is located in the Kings River Basin at an elevation of 8,500 feet. The maximum snow depth of 146 inches exceeded the previous record of 139 inches that occurred in 1939.

MEASURING THE RECORD WATER CONTENT--Two snow surveyors from the Department of Water Resources measure the water content of a 140-inch snowpack at Wrights Lake in the American River drainage basin. The snow core picked up in the tube contained 67 inches of water, contrasted to the 50-year average of 33 inches for April 1. The snow course is at an elevation of 6,900 feet in the Sierra Nevada. Pyramid Peak appears between the trees in the background.

Photograph courtesy of the Department of Water Resources Snow Surveys and Water Forecasting Unit.



DEPTH OF SNOW AT NORDEN

ELEVATION 7000 FEET

SNOWMELT RUNOFF

The accumulation of snow in the winter of 1968-69 was of record proportions. New water-content records were established in all basins of the southern Sierra Nevada. From the Stanislaus River Basin south to the Kern River Basin, 78 of the 109 snow courses set all-time records.

Snow accumulation in the mountains began with the storms of December 1968. At Norden, a station maintained by the Southern Pacific Railroad in the Central Sierra at 7,000 feet, had a snow depth by the end of December which exceeded the 70-year average by a factor of two, and by the end of February was 265 percent of average. Plate 21 illustrates the daily snow depth at Norden.

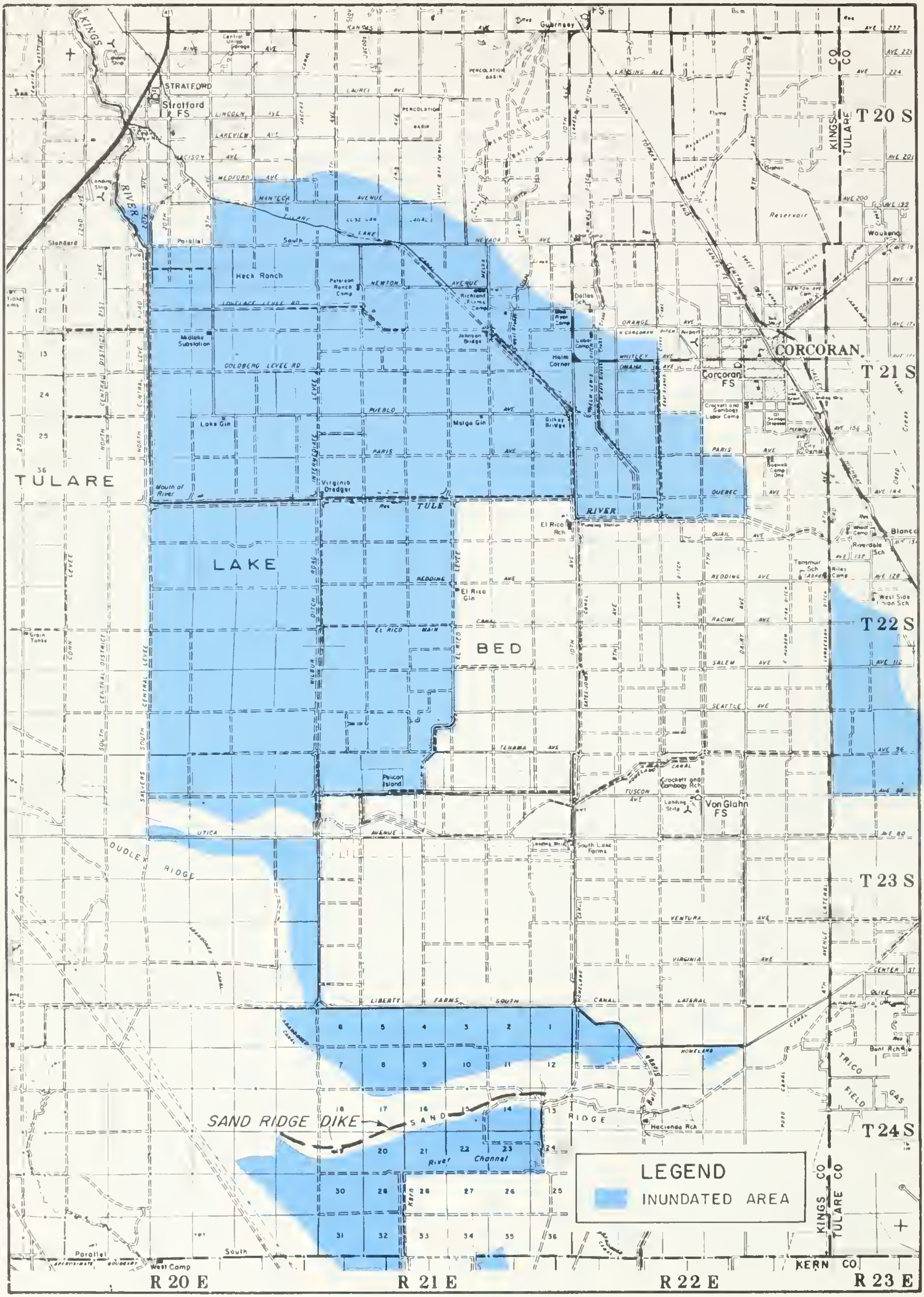
At the Department of Water Resources' snow pillow at Alpha (near Wright's Lake), elevation 7,600 feet in the American River Basin, the water content of the snow rose from 20.5 inches on January 18 to 39 inches on January 30. The water-content accumulation was even more spectacular at locations in the Kings and Kern River Basins. At Upper Woodchuck Meadow (9,100 feet) in the Kings, the water content increased from 18.0 inches on January 18 to 48.5 inches on January 30. At Round Meadow (9,000 feet) in the Kern, the water content increased from 12.0 inches on January 18 to 39.0 inches on January 30. The maximum rate of accumulation at these two locations was about 3.5 inches of water content per day. Time plots of water content for stations in the Lake Tahoe, American River, Mokelumne River, and Kern River Basins are illustrated on Plate 24.

During February, when storms brought above-normal precipitation, more snow accumulated with 10 to 20 inches of water equivalent added to the pack. On March 1, the water content of the Sierra Nevada snowpack in some areas had increased as much as 50 percent over that measured on February 1.

Statewide precipitation during March amounted to only 50 percent of the normal expectancy for the month, a respite from the previous wet months. However, the central and southern Sierra Nevada again received the heavier amount, with precipitation over these areas ranging from 60 to 80 percent of normal. April 1 snow surveys showed that almost all previous records had been broken in the higher elevations of the Sierra. Statewide, the snowpack water content was 210 percent of the April 1 average; above the 7,000-foot level, the water content averaged 60 to 80 inches. The maximum water content was reached either in late March or early April.

April precipitation in the southern Sierra was near normal, and although the snow depth had generally declined, the total water content was greater on May 1 than at any time during the period of record on that date. Unlike the month of April in the previous heavy snowpack year of 1967, which was quite cold, April 1969 had more near-normal temperatures. These temperatures caused the snowpack to ripen earlier. The temperature regime during the melt period was generally characterized by a warm May and a cool June. During July, temperatures over the State were mostly near normal, although many mountain stations on the southern Sierra Nevada had negative departures from the normal. Plots of the daily maximum temperatures at selected stations are shown in Plates 25 through 31.

Early in May the Sierra began to release the heaviest snowmelt of recent time. Water stored in 27 major reservoirs in the southern Sierra on May 1 was only 95 percent of normal for that date. However, many of the reservoirs had encroached upon flood control space, and continued high releases were necessary to retain the maximum possible storage space to contain the forecasted high snowmelt flows.



INUNDATED AREAS IN TULARE LAKE

The basins of the Stanislaus, Tuolumne, Merced, San Joaquin, Kings, and Kaweah Rivers had near-record water content in the snowpacks. The basins of the Tule and Kern Rivers had snowpacks with water contents far in excess of previous records.

Improvement of the Kern River and Jerry Slough Channels by the U. S. Corps of Engineers helped reduce flood damage. The U. S. Bureau of Reclamation cooperated with local agencies in Kern County to permit diversion of Kern River water into the Friant-Kern Canal, reducing the Kern River flood flows. The Department of Water Resources cooperated with local agencies by providing for diversion of Kern River water into the California Aqueduct. A pumping plant constructed on the west bank of the Kern River flood channel pumped Kern River water into the aqueduct. Eighteen miles up the aqueduct a set of pumps lifted the water over a control structure to a higher elevation. Three sets of pumps were used to transport the water a distance of 63 miles up the aqueduct. These accomplishments diverted 250,000 acre-feet of water from the Kern River, which otherwise would have gone into Buena Vista and Tulare Lakes.

The Tulare Lake Basin is a reclaimed lake and is now one of the richest agricultural regions in California. Four major streams terminate in the lake. These are the Kings River entering the basin from the northwest, the Kaweah River entering from the north east, the Tule River entering from the east, and the Kern River entering from the south. Flood control reservoirs on these four rivers prevent flooding of the lakebed except in years of very large flood flows. The rivers flowing into the lakebed are confined by levees. The lakebed itself is formed into a series of cells by additional levees.

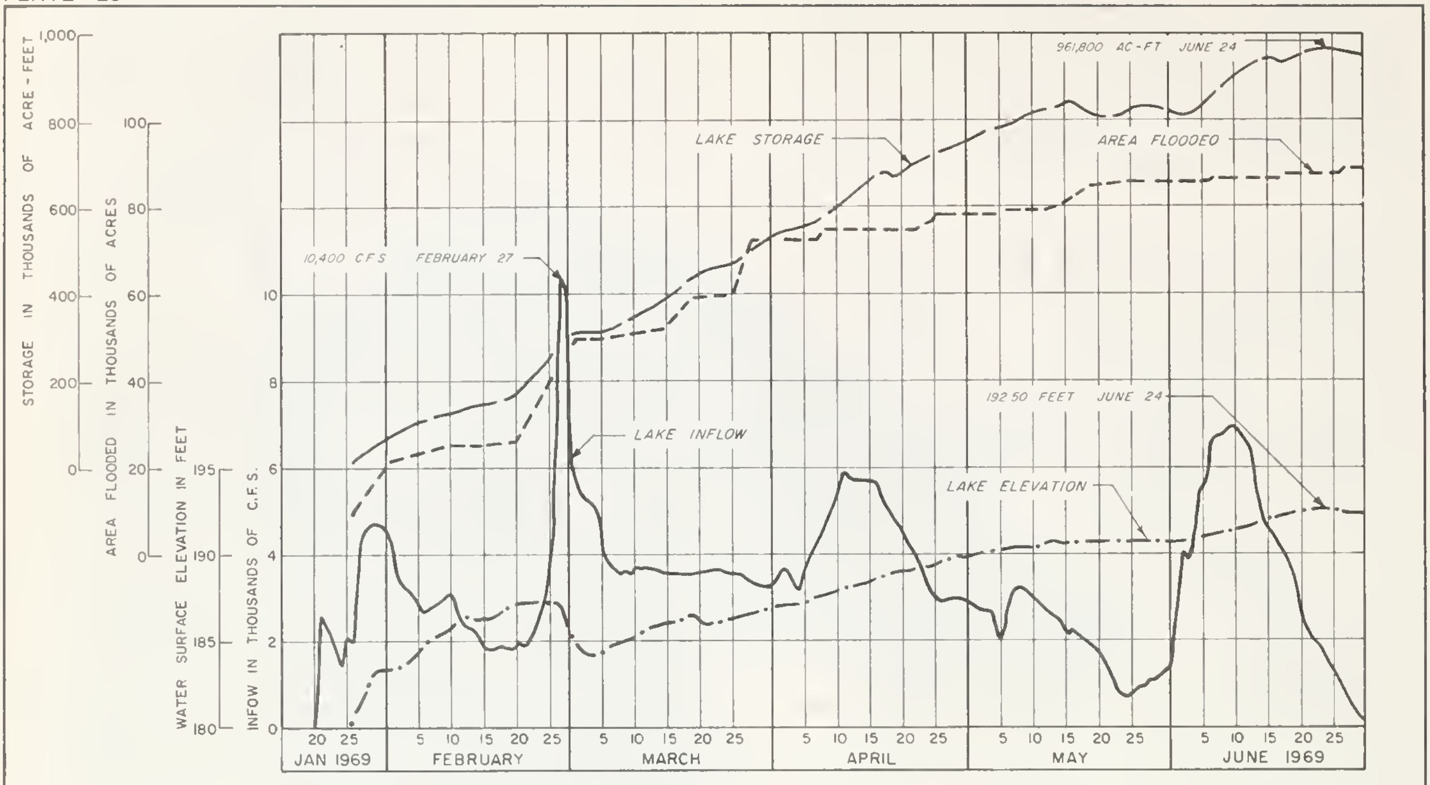
During the irrigation season of most years, trailer-mounted diesel-engine pumps are used to pump water from river channels into the distribution systems for irrigation of land within the cells. During years of excessive runoff when the water cannot be confined to the river channels, successive cells are flooded. In 1967, the excess runoff was stored in the Basin Cell and in a portion of the Brown Cell, which caused flooding of 17,300 acres.

This year, several cells in the lake bed were flooded, covering over 89,000 acres with approximately 962,000 acre-feet of water. During the early streamflow runoff period, the Kings River flow was conveyed into the San Joaquin River system. However, as streamflows increased, it was necessary to route some of the Kings River flood flows into Tulare Lake. In addition, there were high inflows from the Kaweah, Tule, and Kern Rivers. Preliminary figures indicate that the total inflow into Tulare Lake during the period January through July included 329,000 acre-feet from Kaweah River; 287,000 acre-feet from Kern River; 219,000 acre-feet from Tule River; 181,000 acre-feet from Kings River; and 75,000 acre-feet from other sources. A map showing the area inundated in the Tulare Basin is on Plate 22, and a hydrograph of Tulare Lake for the period January through June is shown on Plate 23. Table 9 shows total monthly inflow and storage at Buena Vista Lake.

All measures possible were taken to reduce the inflow to Tulare Lake. The Corps of Engineers constructed levees in the Sand Ridge area south of the lakebed. The levees retained 100,000 acre-feet of inflow from the Kern River. Prior to the construction of the levees, 1,500 cfs of Kern River flow was entering the lake.

Flood control releases at all foothill reservoirs were at very high rates to prevent uncontrolled spilling of the reservoirs. The high flows caused damage along some river channels, particularly the Kings and San Joaquin Rivers.

PLATE 23



HYDROGRAPH OF TULARE LAKE

Table 9: Buena Vista Lake Operation

Date	All Units in Acre-Feet				
	Storage at End of Month	Total In Flow	Irrigation Use	Reservoir Loss	Change in Storage
	686 (est.)				
January 25-31	2,026	1,803	343	120	+ 1,340
February 1-28	2,144	6,405	3,703	2,584	+ 118
March 1-31	4,042	5,639	420	3,321	+ 1,898
April 1-30	20,635	24,080	1,565	5,922	+16,593
May 1-31	24,000	7,682	565	3,752	+ 3,365
June 1-30	29,324	10,483	561	4,598	+ 5,324
July 1-31	27,411	7,567	4,237	5,243	- 1,913
	Total	63,659	11,394	25,540	

*Maximum storage 31,075 acre-feet on August 19, 1969

May 1 storage in 33 major Sacramento Valley stream reservoirs was 12,712,000 acre-feet, or 115 percent of normal for this date. None of the flood control reservoirs in the Sacramento River Basin was encroached into flood control storage space on that date. There were no flooding or high water problems in the Sacramento River basins due to snowmelt.

The first significant temperature warming began on May 4 and continued through June 6, with the exception of three brief cool periods. As temperatures began to rise, streamflows increased steadily toward record peak flows. Most of San Joaquin River basins experienced peak snowmelt inflows to reservoirs and peak releases to rivers during late May or early June. The Sacramento River drainage basins had peak snowmelt flows much earlier. The Feather River inflow to Oroville Reservoir peaked on May 11, and the American River inflow to Folsom Reservoir peaked May 12.

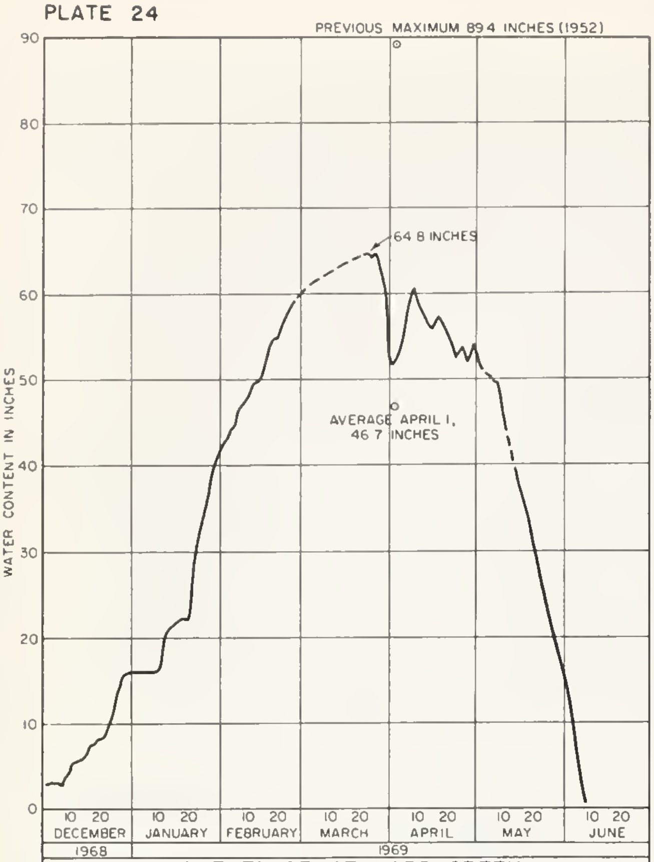
In early June a significant change in the weather pattern occurred with the development of a blocking ridge of high pressure over British Columbia and concurrently a series of cold low pressure centers or troughs over California. This development began about June 5, and cooler air masses associated with the low pressure centers brought departures of 10 to 20 degrees in the temperatures at the mountain stations. Warming commenced about June 11, but the recovery was only to near-normal temperatures. The period of one week of cool temperatures had a pronounced affect on lowering inflow rates to the Sierra reservoirs. The cool temperatures also provided valuable time to gain additional storage space in all the major reservoirs as the inflow rates dropped below the reservoir release rates.

The Flood Emergency, which was declared by Governor Reagan on January 20, continued during the snowmelt period and officially ended on July 2.

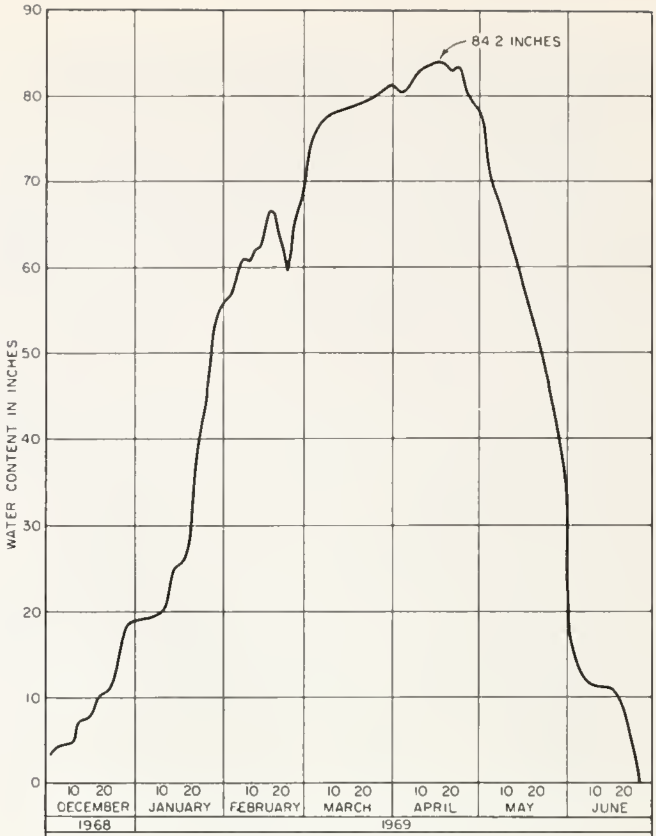
Flood control releases through the Oroville Dam spillway.

Photograph - courtesy of Department of Water Resources Graphic Services.

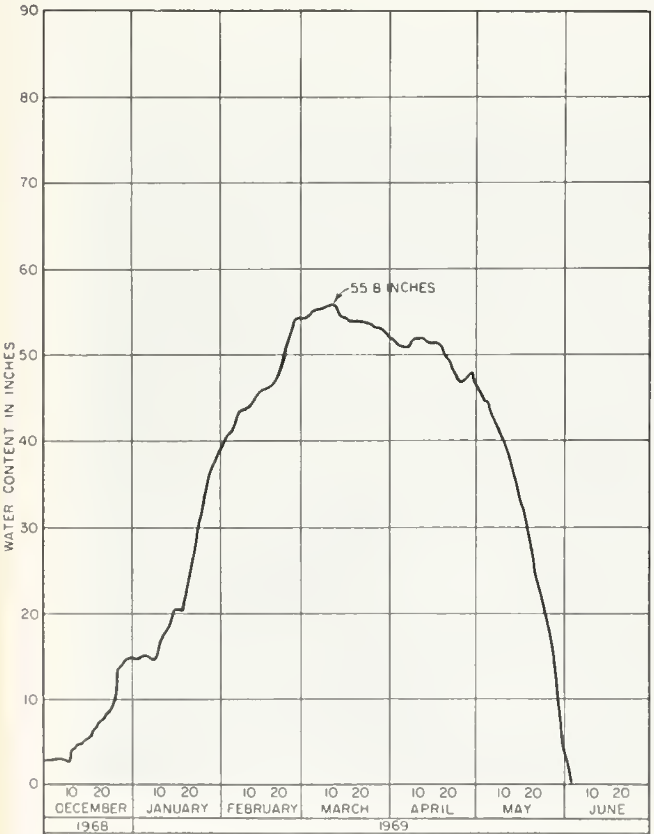
PLATE 24



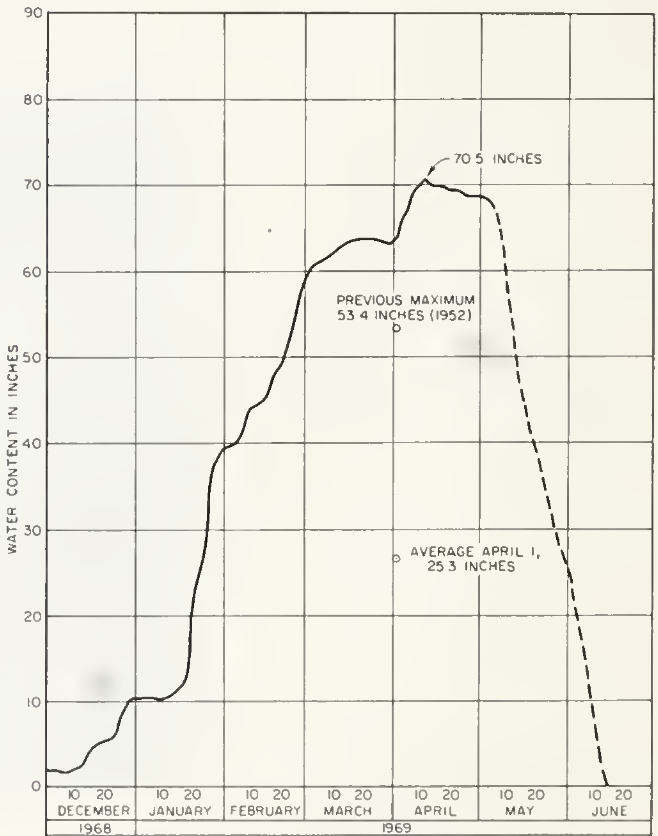
LAKE TAHOE AT WARD CREEK
ELEVATION 7850 FEET



MOKELUMNE RIVER BASIN AT MOUNT REBA
ELEVATION 7850 FEET



AMERICAN RIVER BASIN AT ALPHA
ELEVATION 7600 FEET



KERN RIVER BASIN AT ROUND MEADOW
ELEVATION 9,000 FEET

WATER CONTENT OF SNOW

OPERATION OF DAMS

Shasta Dam

Shasta Reservoir, on the upper Sacramento River, has a storage capacity of 4,500,000 acre-feet. Keswick Reservoir, which regulates the Shasta releases to the Sacramento River, has a capacity of 23,800 acre-feet. During the 1969 water year, October 1, 1968 through September 30, 1969, the peak daily inflow to Shasta Reservoir was 88,000 cfs on January 21. The peak daily release from Shasta Reservoir was 48,300 cfs on January 21, and the peak daily release to the Sacramento River from Keswick was 50,000 cfs on January 22-28. The peak inflow and releases that occurred in January exceeded those which occurred later during the snowmelt runoff period.

The maximum daily inflow to Shasta Reservoir due to snowmelt was 27,200 cfs on April 5, and the maximum daily release to the Sacramento River from Keswick was 16,000 cfs from May 15-22. Shasta Reservoir storage reached a maximum for the year of 4,517,900 acre-feet on May 15. The computed total unimpaired runoff to Shasta Reservoir during the water year was 7,666,000 acre-feet, or 144 percent of the 50-year average.

Hydrographs of the Shasta Dam complex, showing inflow and storage for Shasta Reservoir, and releases from Keswick Reservoir to the Sacramento River are shown on Plate 25.

Black Butte Dam

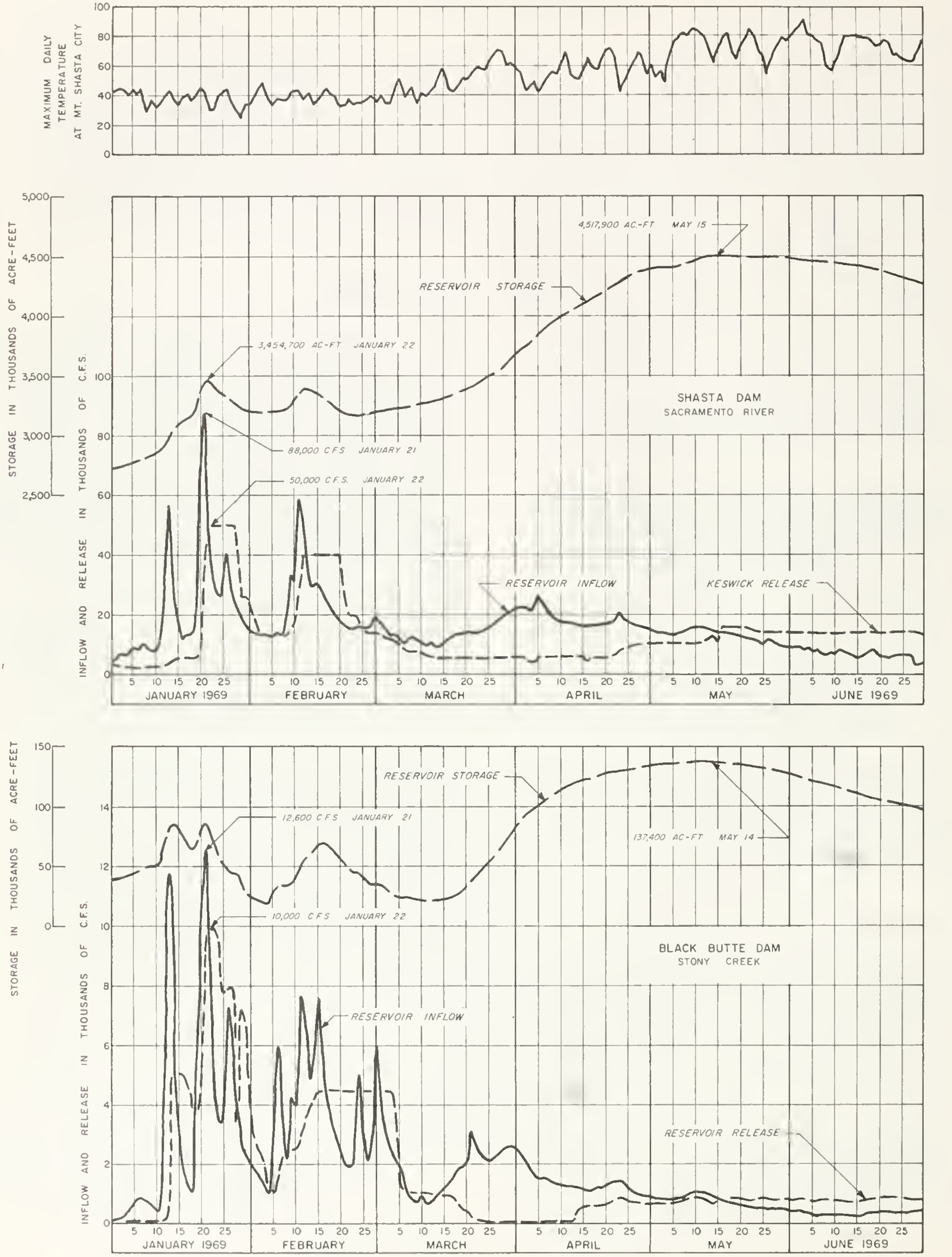
Black Butte Reservoir on Stony Creek, a west-side tributary to the Sacramento River, has a maximum storage capacity of 160,000 acre-feet. The peak daily inflow to Black Butte and the maximum daily release to Stony Creek occurred in January during the intense rainfall period. On January 21, the peak daily inflow reached 12,600 cfs, and on the following day, January 22, the maximum daily release of 10,000 cfs occurred.

During the snowmelt period, Black Butte Reservoir releases to Stony Creek were held to a relatively low mean daily peak of 920 cfs. Reservoir storage increased sharply in March and April and reached the year's maximum storage of 137,400 acre-feet on May 14. Hydrographs of inflow, release, and storage are shown on Plate 25.

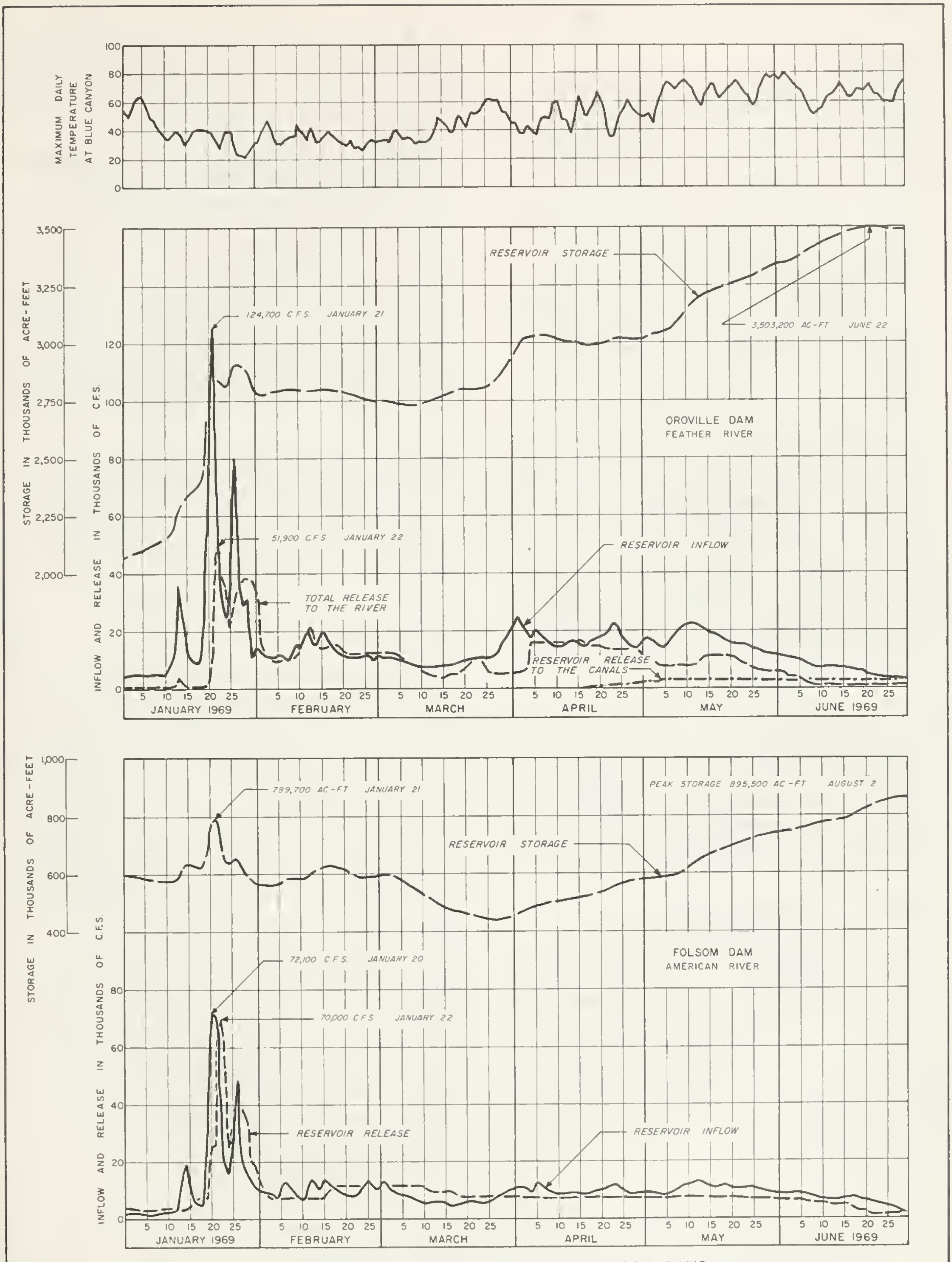
Oroville Dam

Oroville Reservoir, filling for the first time, reached a peak storage of 3,503,200 acre-feet on June 11. The maximum storage capacity is 3,538,000 acre-feet. In the Feather River Basin the snowpack accumulated through the winter season normally melts early in the spring. The daily peak inflow to Oroville Reservoir during the 1969 snowmelt period was 26,700 cfs, which occurred on April 1. The releases from the Oroville Reservoir complex were increased gradually from 7,100 cfs on April 2 to the maximum daily, during the snowmelt period, of 16,000 cfs on April 4 through April 17. In contrast, the peak daily release during the rainfall-runoff period was 51,900 cfs on January 22.

During the period October 1, 1968 to September 30, 1969, the computed unimpaired runoff in the Feather River Basin was 7,044,100 acre-feet. This flow was 169 percent of average. The measured flow in the Feather River below Oroville Reservoir during the same period was 4,509,300 acre-feet. Hydrographs of inflow and storage for Oroville Reservoir and total releases from the Oroville Complex are shown on Plate 26.



OPERATION OF SHASTA AND BLACK BUTTE DAMS



OPERATION OF OROVILLE AND FOLSOM DAMS

Folsom Dam

On April 1, 1969, Folsom Reservoir, located on the extreme lower portion of the American River Basin, had 556,400 acre-feet of available storage space to retain the spring runoff. Other reservoirs in the basin provided an additional 472,000 acre-feet of available storage. During the period April 1, 1969 through July 31, 1969, the computed unimpaired runoff in the American River was 2,191,000 acre-feet, or 165 percent of a 50-year average. During the entire water year the unimpaired runoff was 4,427,600 acre-feet, or 175 percent of average.

The peak daily inflow to Folsom Reservoir was 72,100 cfs, which occurred on January 20. The peak daily inflow during the snowmelt period was 14,100 cfs on May 12. The maximum daily release from Folsom Reservoir during the year was 72,100 cfs on January 20. The maximum daily release during the snowmelt period was 8,400 cfs on May 12. These releases are relatively low when compared with the downstream channel capacity of 115,000 cfs.

During the year, Folsom Reservoir reached its peak storage of 895,000 acre-feet on August 2. The maximum storage capacity is 1,010,000 acre-feet. Shown in Plate 26 are hydrographs of inflow, releases, and storage of Folsom Reservoir during the January-June 1969 period.

Pardee and Camanche Dams

The North, Middle, and South Forks of the Mokelumne River provide the inflow to Pardee Reservoir. Camanche Reservoir is located immediately downstream from Pardee Dam, and, for all practical purposes, the two reservoirs are essentially one, with the discharge from Pardee being almost the total inflow to Camanche. The hydrographs in Plate 27 show the mean daily inflow to Pardee Reservoir, the daily release from camanche Reservoir, and the storage in both reservoirs during the period January-June 1969.

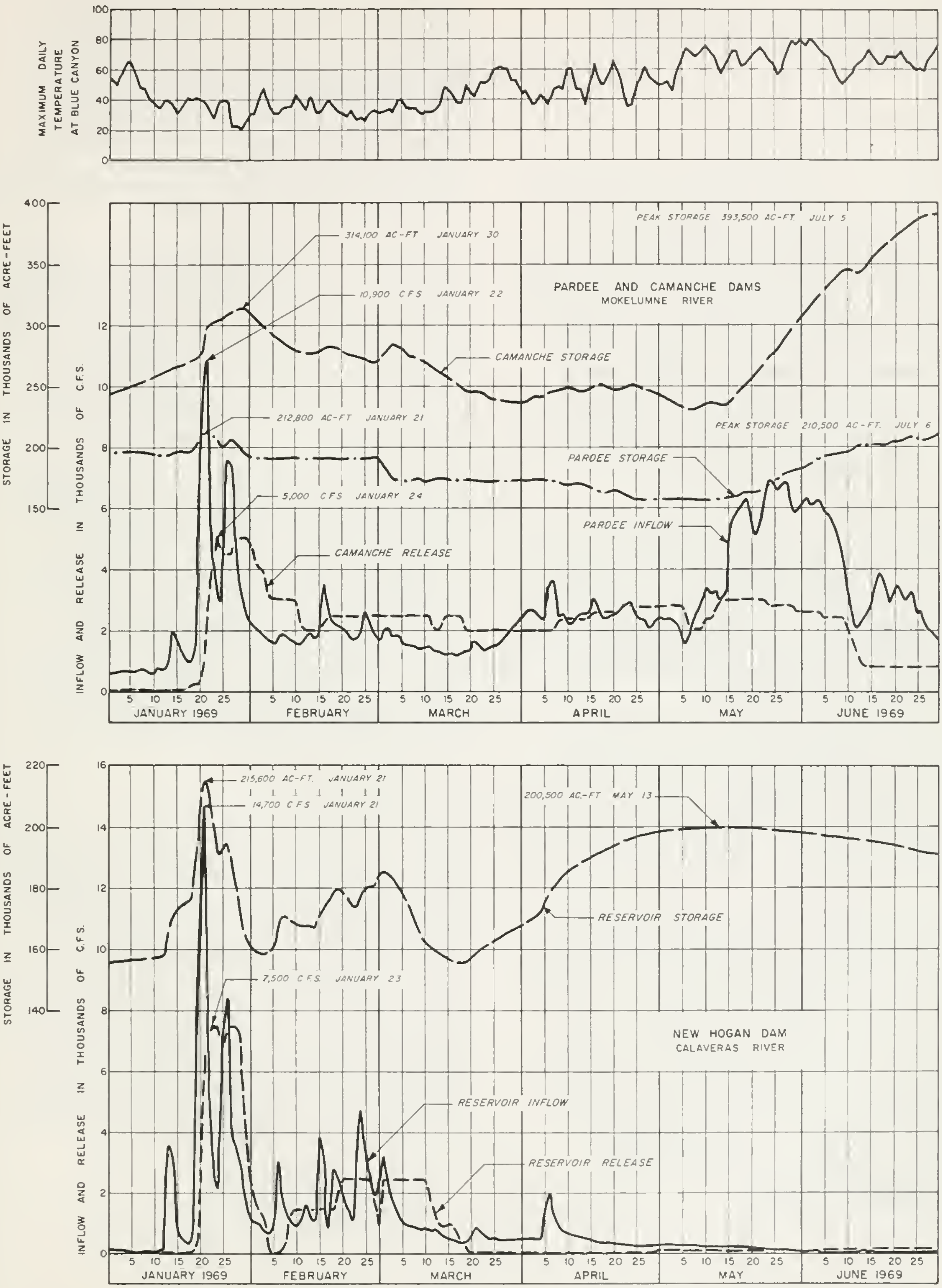
In January, encroachment above permissible storage in Camanche Reservoir occurred, and releases from the reservoir were increased from 100 cfs to a maximum daily of 5,000 cfs on January 24. Early in February, reservoir storage fell below the allowable storage for flood control, and releases from Camanche Reservoir were decreased and maintained between 2,000 cfs and 3,000 cfs during the snowmelt-runoff period. The nondamaging downstream channel capacity is approximately 5,000 cfs.

The computed imunpaired runoff in the Mokelumne River during the water year was 1,333,500 acre-feet. This flow is 193 percent of the 50-year average. The measured flow below the reservoirs was 1,284,600 acre-feet.

New Hogan Dam

New Hogan Reservoir on the Calaveras River serves to control the flows in the basin. The reservoir reached a peak storage of 215,000 acre-feet on January 21. Inflow to New Hogan Reservoir began to increase rapidly on January 19 and reached a peak daily flow of 14,700 cfs on January 21. Reservoir storage exceeded the flood control permissible storage on January 19, and reservoir releases were increased to a peak daily 7,500 cfs.

Snowmelt flows in the Calaveras River Basin are usually not too significant because of the basin's relatively low elevation. On March 10, reservoir releases were reduced to a minimum flow and maintained during the snowmelt period. Peak reservoir storage during the snowmelt period was 200,500 acre-feet on May 13. Storage was well-below the permissible flood storage during the snowmelt-runoff period.



OPERATION OF PARDEE, CAMANCHE AND NEW HOGAN DAMS

Plate 27 shows the hydrographs of inflow, release, and storage for New Hogan Reservoir during the period January-June 1969.

Melones and Tulloch Dams

The four major reservoirs in the Stanislaus River Basin--Donnells, Beardsley, Melones, and Tulloch--are principally for the generation of hydroelectric power and downstream irrigation rather than for flood control. The outlet structures of the reservoirs have extremely limited discharge capacities, and reservoir releases cannot be adjusted for high rates of flow. Therefore, uncontrolled spill occurs at each reservoir when the inflow exceeds the maximum rate of discharge and the reservoir is filled to capacity.

Donnels Reservoir, located on the Middle Fork of the Stanislaus River and the uppermost reservoir on the stream system, has a maximum storage capacity of 64,700 acre-feet. When the reservoir water surface is below the spillway lip, releases are limited to about 400 cfs from a discharge valve and about 700 cfs through the powerhouse.

Beardsley Reservoir is located below Donnells Reservoir on the Middle Fork of the Stanislaus River. The reservoir has a storage capacity of 97,500 acre-feet and maximum release capability of 650 cfs when the water surface is below the spillway crest.

Melones Reservoir, located well below the confluence of the South Fork, with the main branch of the Stanislaus River, has maximum storage capacity of 112,600 acre-feet. Tulloch Reservoir, located below Melones, has a maximum storage capacity of 68,200 acre-feet. A maximum release to the Stanislaus River of approximately 1,800 cfs can be made through the Tulloch powerhouse, and a maximum 3,000 cfs through release valves when the reservoir storage is less than 37,600 cfs.

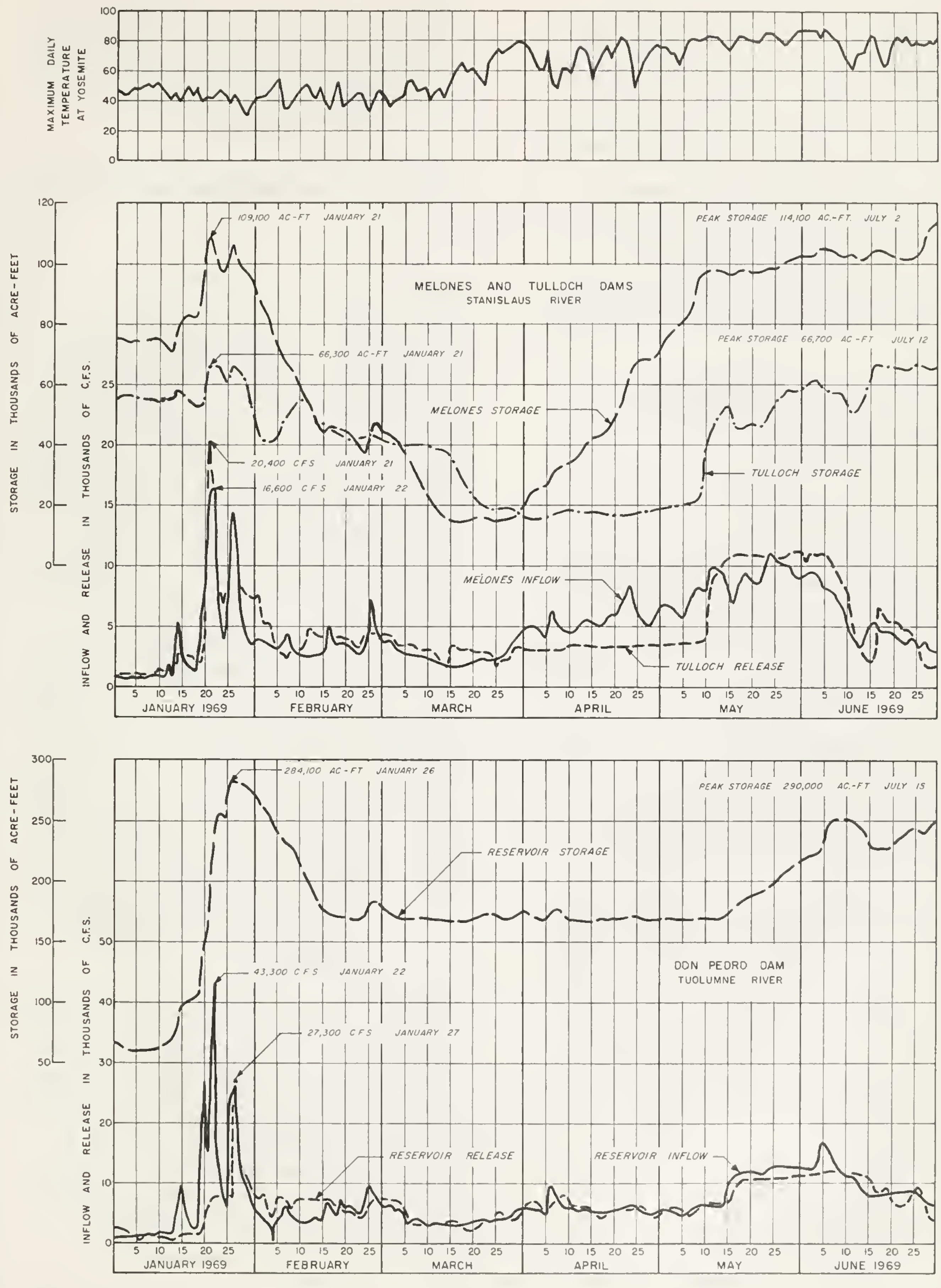
On January 13, Tulloch Reservoir filled and began to spill. The discharge to the river increased until it reached a maximum daily flow of 20,400 cfs on January 21. During the peak discharge the reservoir storage reached 66,300 acre-feet. Maximum releases were made from Tulloch Reservoir during February and March to gain storage space for continuing storms and the anticipated large volume of snowmelt runoff.

On April 1, Melones Reservoir had 31,400 acre-feet in storage, and Tulloch Reservoir was storing 16,000 acre-feet. On May 8, Melones Reservoir filled and began to spill, causing Tulloch Reservoir to fill rapidly. On May 10, Tulloch Reservoir began spilling again and reached a peak discharge during the snowmelt period of 10,900 cfs on May 22.

The maximum storage in both reservoirs occurred in July when Melones Reservoir reached 114,100 acre-feet and Tulloch Reservoir reached 66,700 acre-feet. During the 1969 water year, the computed unimpaired runoff in the Stanislaus River Basin was 2,206,500 acre-feet, which is 209 percent of a 50-year average. Hydrographs of inflow to Melones Reservoir, release from Tulloch Reservoir, and storage at both reservoirs are shown in Plate 28.

Don Pedro Dam

The three main reservoirs in the Tuolumne River Basin--Cherry Valley, Hetch Hetchy, and Don Pedro--have a total storage capacity of 919,000 acre-feet. Don Pedro Reservoir, with a storage capacity of 290,000 acre-feet, almost reached its capacity during the rainfall-runoff period; on January 26, the storage reached 284,100 acre-feet. The maximum daily inflow was 43,300 cfs, which occurred on January 22, and the maximum daily reservoir release reached 27,300 cfs on January 27.



OPERATION OF MELONES, TULLOCH AND DON PEDRO DAMS

During the snowmelt period, the peak inflow and reservoir release were much less than had occurred in January, but the peak storage for the water year occurred on July 15 when the reservoir reached 290,000 acre-feet. The computed unimpaired runoff in the Tuolumne River Basin during the period April 1-July 31 was 2,405,300 acre-feet, or 204 percent of average. The unimpaired runoff for the 1969 water year was 3,766,700 acre-feet, which is 213 percent of the 50-year average. The measured flow below Don Pedro Dam during the water year was 3,182,400 acre-feet.

Hydrographs of inflow, release, and storage for Don Pedro Reservoir are shown in Plate 28.

New Exchequer Dam

New Exchequer Reservoir, on the Merced River, has a maximum storage capacity of 1,026,000 acre-feet. On January 28 encroachment above permissible flood storage reservation occurred. Reservoir releases were increased until a maximum outflow of 5,100 cfs was reached on February 9. These relatively high flows were maintained until March 10 and then reduced to 3,300 cfs. The maximum daily inflow for the water year was 33,500 cfs on January 21. During the rainfall-runoff period, the peak storage was 735,100 acre-feet on February 7.

Due to snowmelt runoff, inflow to New Exchequer Reservoir gradually increased beginning March 15 and reached a peak daily of 12,600 cfs on June 1. Reservoir releases were gradually increased from 3,800 cfs on May 8 to a maximum daily 8,270 cfs on June 5. Reservoir storage continued to increase until July 14, when the peak storage for the winter year, 1,026,200 acre-feet, was reached.

During the water year, the computed unimpaired flow in the Merced River Basin was 2,203,000 acre-feet, or 245 percent of average. The measured flow in the Merced River below New Exchequer Dam was 1,770,000 acre-feet.

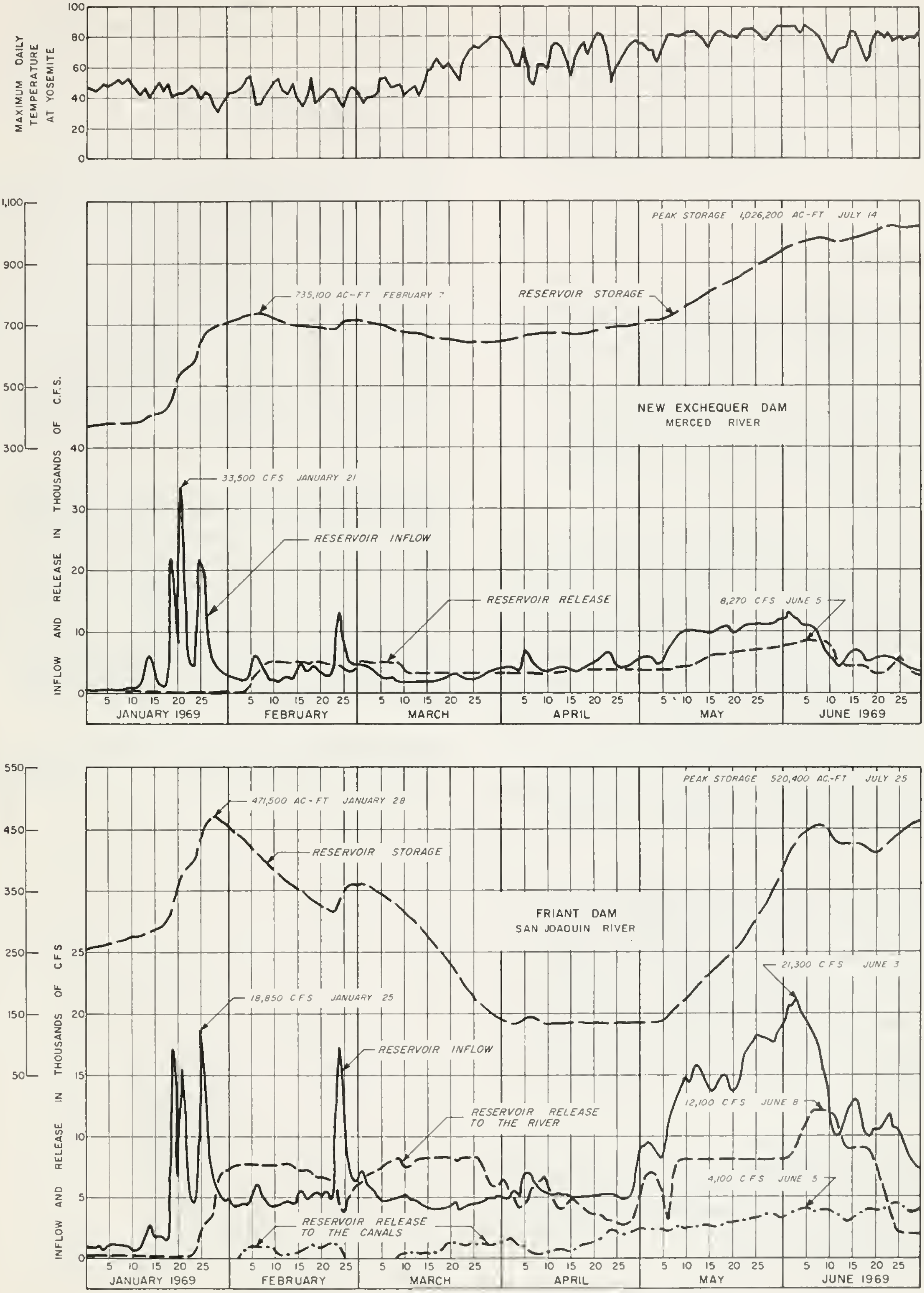
Hydrographs of inflow, release, and storage for New Exchequer Dam are shown in Plate 29.

Friant Dam

Friant Dam is located at the mouth of the Upper San Joaquin Basin. The reservoir has a maximum storage capacity of 520,500 acre-feet and provides the major flood-control regulation for the San Joaquin River. Upstream from Friant Dam are: Crane Valley Dam, Shaver Lake, Huntington Lake, Mammoth Pool, Florence Lake, and T. A. Edison Dam. These upstream reservoirs, constructed for hydroelectric power, have a combined storage capacity of 608,000 acre-feet.

On January 1, 1969, the storage in Friant Reservoir was 257,000 acre-feet. On January 25, the mean daily inflow to Friant reached 18,850 cfs, and encroachment above permissible storage occurred. On January 18, the storage in Friant Reservoir was 471,500 acre-feet, the peak during the rainfall-runoff period. Heavy precipitation during February delayed the recession of reservoir storage, but on May 1, when snowmelt runoff began to increase, there were 283,000 acre-feet of available storage in Friant Reservoir and approximately 366,000 acre-feet available in the upper San Joaquin reservoirs.

On June 3, the inflow to Friant Reservoir reached the 1969 water year's peak mean daily flow of 21,300 cfs. Reservoir releases were increased to a peak mean daily 12,100 cfs. Friant Reservoir storage rose rapidly during May and reached 453,900 acre-feet on June 9. The storage receded slightly during the period June 10-20, and then began to rise again and reached a peak of 520,400 acre-feet on July 25.



OPERATION OF NEW EXCHEQUER AND FRIANT DAMS

The computed unimpaired runoff to Friant Reservoir during May was 1,096,100 acre-feet. This inflow is 261 percent of a 50-year average. Hydrographs of Friant Reservoir, showing inflow, releases to the San Joaquin River, releases to canals, and storage for the period January 1 through June 30 are shown on Plate 29.

Pine Flat Dam

Pine Flat Reservoir, which has a maximum storage capacity of 1,000,000 acre-feet, receives virtually all of the runoff from the Kings River Basin. Two relatively small hydroelectric power regulating reservoirs in the upper basin, Courtright and Wishon, have a combined storage capacity of 251,860 acre-feet.

On January 25, the inflow to Pine Flat Reservoir reached the season's peak daily flow of 39,900 cfs. Relatively high intensities of rainfall in January caused the storage in Pine Flat Reservoir to increase from 453,000 acre-feet on January 31. Additional rainfall in February caused a further rise in storage to 819,000 acre-feet on February 28. During March and April, the reservoir storage receded slowly and on May 6, when snowmelt-runoff increased sharply, there was only 425,000 acre-feet of storage space available.

Releases from Pine Flat Reservoir were continually increased during the snowmelt runoff period and reached a peak daily flow of 17,000 cfs on June 4. A rapid rise in temperatures in May and early June caused increased snowmelt and the maximum daily inflow of 22,900 cfs on June 2. The maximum reservoir storage for the year, 999,500 acre-feet, occurred on June 9.

The computed unimpaired runoff in the Kings River Basin during the water year was 4,243,300 acre-feet, or 330 percent of average. The measured flow in the Kings River below Pine Flat Reservoir was 3,767,800 acre-feet.

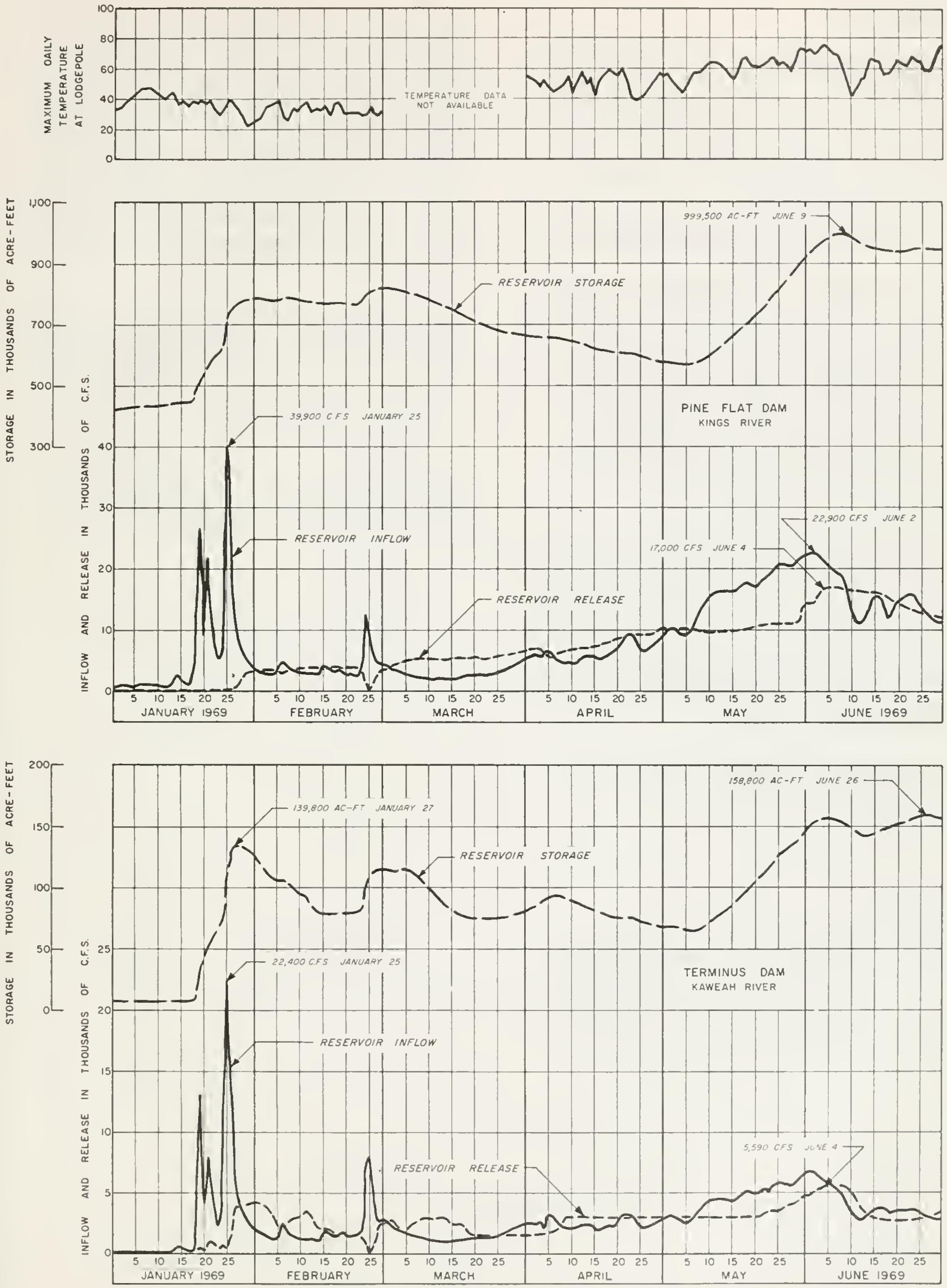
Hydrographs of inflow, release, and storage for Pine Flat Dam are shown in Plate 30.

Terminus Dam

Terminus Reservoir, the only flood control reservoir in the Kaweah River Basin, has a stoage capacity of 150,000 acre-feet. During the snowmelt runoff period, the U. S. Corps of Engineers constructed a temporary retaining wall on the spillway of Terminus Dam to increase the sto storage capacity. On June 1, the reservoir storage reached the spillway crest, but the additional reservoir space provided by the temporary retaining wall was sufficient to permit a peak storage of 158,800 acre-feet of runoff by June 26.

During the 1969 water year, the computed unimpaired runoff to Terminus Reservoir was 1,265,500 acre-feet. This flow was 330 percent of average. The peak daily inflow was 22,400 cfs, which occurred On January 25 during the rainfall-runoff period. During the snowmelt period, the peak daily inflow to Terminus Reservoir was 6,800 cfs on June 1, and the peak daily release was 5,590 cfs on June 4.

Hydrographs of inflow, release and storage for Terminus Reservoir are shown on Plate 30.



OPERATION OF PINE FLAT AND TERMINUS DAMS

Success Dam

Success Reservoir, the only flood control structure in the Tule River Basin, has a storage capacity of 85,400 acre-feet. The U. S. Corps of Engineers increased this storage capacity by constructing a temporary retaining wall across the spillway. On June 20, Success Reservoir reached its maximum storage for the year, 95,300 acre-feet.

Intense rainfall during January caused the year's daily peak inflow to Success Reservoir of 12,820 cfs on January 25. Heavy rainfall in February caused a relatively high daily inflow of 7,800 cfs, and a peak storage during the rainfall-runoff period of 83,000 acre-feet on February 26. The peak release from Success Reservoir to Tule River was 3,210 cfs on February 28.

The peak daily inflow to Success Reservoir dur to snowmelt-runoff was 2,150 cfs on April 5. The computed unimpaired runoff in Tule River for the water year was 499,500 acre-feet, which is 404 percent of average. During the snowmelt period, April 1 through July 31, the unimpaired runoff was 222,400 acre-feet, or 399 percent of average.

Hydrographs of inflow, release, and storage for Success Reservoir are shown on Plate 31.

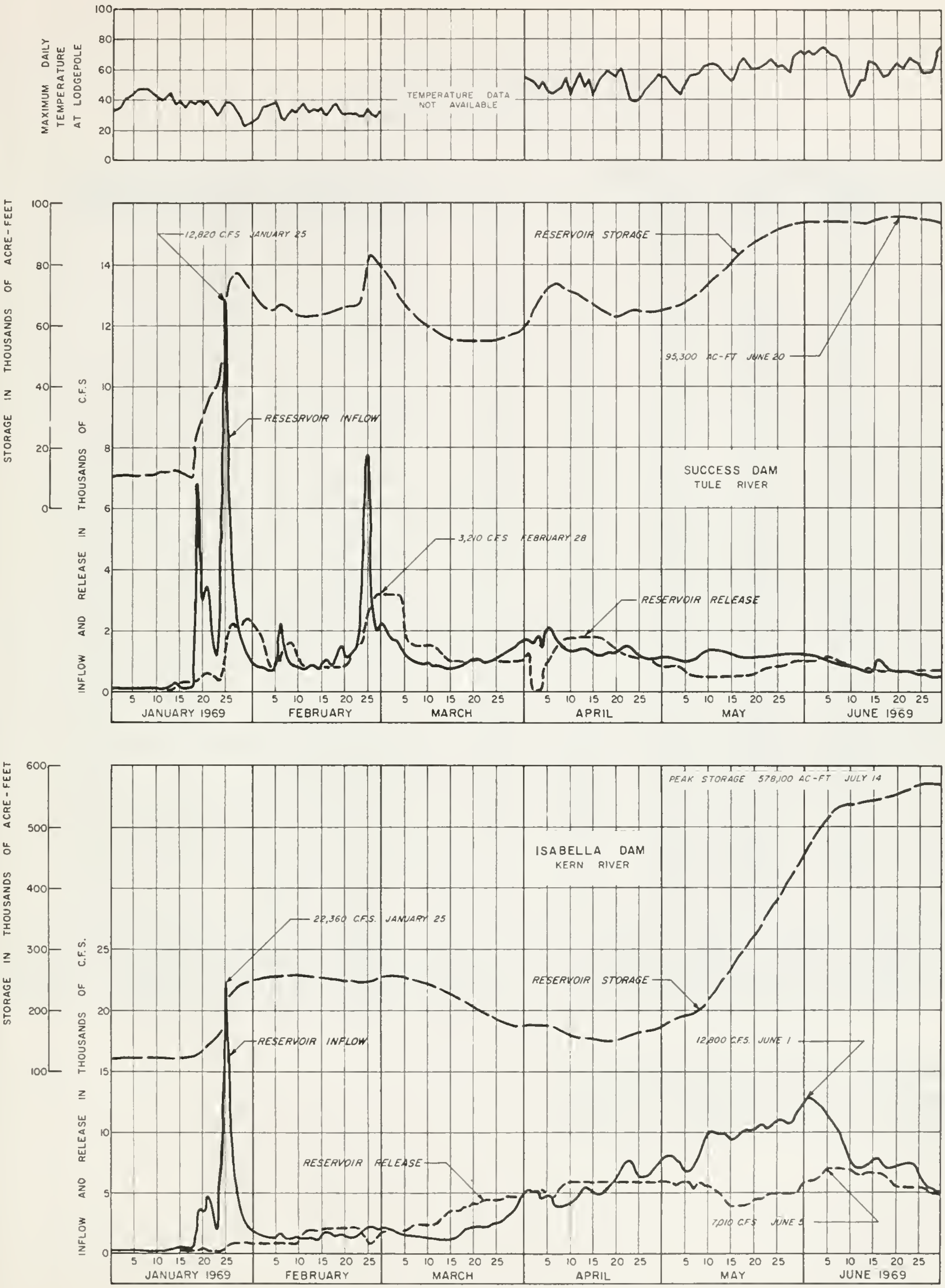
Isabella Dam

Isabella Reservoir is the only major storage reservoir in the Kern River Basin. The reservoir has a storage capacity of 570,000 acre-feet. On July 1, Isabella Reservoir filled for the first time since its construction 16 years ago.

During the intense rainfall of January, the inflow to the reservoir reached a peak daily flow of 22,400 cfs. The peak daily inflow during the snowmelt-runoff period was 12,860 cfs. In January and February, the releases to Kern River were maintained at minimum flows. Reservoir releases were increased in March and April to gain storage space for the anticipated snowmelt-runoff. The peak daily release occurred on June 5 and was 7,010 cfs.

The computed unimpaired runoff in the Kern River Basin during the water year was 2,406,600 acre-feet, which is 373 percent of average. The measured flow in the Kern River near Bakersfield was 2,131,000 acre-feet.

Hydrographs of inflow, release, and storage for Isabella Reservoir are shown on Plate 31.



OPERATION OF SUCCESS AND ISABELLA DAMS

Table 10

UNIMPAIRED STREAMFLOW

Mean Daily Flow in Thousands of C.F.S.

Tuolumne River at LaGrange

Day	April	May	June	July
1	8.0	9.0	19.4	7.1
2	7.6	9.4	19.9	7.5
3	7.1	8.8	20.2	7.8
4	7.7	7.7	18.6	6.3
5	8.3	6.9	18.6	6.7
6	9.3	8.5	18.3	6.7
7	9.1	10.7	18.4	6.5
8	7.1	12.5	15.4	5.8
9	5.1	15.2	13.4	6.0
10	4.0	15.4	10.1	6.4
11	6.2	18.1	7.4	6.3
12	6.2	15.2	8.7	6.5
13	7.1	15.6	8.6	6.1
14	7.3	15.9	12.1	6.6
15	6.3	13.6	11.9	6.0
16	5.5	15.4	12.4	5.5
17	5.2	15.9	11.6	5.9
18	6.3	15.9	8.8	5.0
19	6.6	17.4	9.2	4.7
20	7.2	15.8	10.6	4.4
21	9.1	15.0	11.1	4.4
22	9.9	16.6	10.6	4.4
23	10.3	16.1	11.0	4.3
24	9.9	18.0	9.6	3.7
25	7.9	18.0	9.5	3.5
26	6.7	17.8	8.8	3.6
27	6.2	18.1	8.3	2.4
28	6.4	17.8	7.3	2.3
29	7.2	17.3	6.3	2.3
30	8.3	18.1	8.0	2.4
31		18.1		1.9
Total C.F.S.	219.1	453.8	364.1	159.0
Total Ac.-Ft.	438.2	907.6	728.2	318.0

Stanislaus River at Tulloch Res.

April	May	June	July
5.7	6.2	11.2	3.9
5.5	7.3	11.7	2.4
5.1	6.1	11.9	2.5
4.2	5.0	11.6	2.0
4.1	4.9	10.4	2.6
7.3	6.4	10.2	2.9
5.4	7.8	9.8	2.7
4.1	9.1	8.5	2.5
3.7	9.9	7.7	2.3
3.7	10.1	5.6	2.2
3.6	13.6	4.6	2.5
4.4	11.9	3.7	2.4
5.3	11.6	3.9	2.3
5.2	11.7	4.4	2.3
4.7	12.2	5.2	3.0
3.9	10.3	6.2	2.4
3.9	12.3	7.2	1.7
4.6	12.3	5.3	1.7
5.2	12.7	5.3	1.6
5.2	11.3	6.2	1.6
6.1	11.0	5.4	1.6
7.4	10.9	5.0	1.7
8.6	11.9	5.0	1.6
7.0	12.6	4.9	1.4
5.3	12.7	4.5	1.7
4.6	11.9	3.2	1.1
4.0	12.6	3.3	1.3
3.5	13.3	2.9	1.0
5.1	11.5	3.0	1.1
6.0	11.4	2.7	.9
	11.5		.9
152.4	324.0	190.5	61.8
301.8	641.5	377.2	122.4

Note: Stanislaus River inflow computation does not include reservoirs for which data were not available on a daily basis.

Table 10 (Cont'd)

UNIMPAIRED STREAMFLOW

Mean Daily Flows in Thousands of C.F.S.

	San Joaquin River at Friant Dam				Merced River at New Exchequer Dam			
Day	April	May	June	July	April	May	June	July
1	7.5	11.3	24.4	10.3	3.2	5.8	12.6	3.9
2	7.3	11.3	24.7	10.1	4.1	5.9	12.2	3.9
3	7.3	10.0	24.4	9.4	3.7	5.7	12.4	3.7
4	6.3	9.7	22.9	9.2	3.1	4.7	11.4	3.5
5	8.4	9.3	21.8	9.1	7.2	4.6	10.9	3.2
6	8.8	11.7	20.8	8.7	6.5	5.8	10.6	3.3
7	6.0	14.5	19.9	8.4	4.9	7.4	9.8	3.0
8	5.8	16.5	18.1	8.4	3.8	8.7	9.1	3.1
9	5.5	17.9	15.6	8.5	3.6	9.6	7.3	3.0
10	5.8	18.9	12.3	7.9	3.3	9.9	5.9	2.8
11	5.7	19.1	10.2	8.0	3.3	9.4	4.6	2.8
12	7.5	20.1	10.2	8.3	3.8	9.9	4.3	2.7
13	7.4	19.9	11.9	9.5	4.0	10.1	4.8	2.7
14	7.3	18.8	13.8	9.5	3.9	10.2	6.3	3.0
15	6.1	18.4	14.7	8.2	3.5	9.5	6.5	2.5
16	5.9	17.9	14.6	7.6	3.2	9.5	7.1	2.3
17	6.8	19.3	12.6	7.2	3.4	10.2	6.7	2.0
18	7.9	19.8	10.7	7.2	3.9	10.7	4.8	1.9
19	7.9	18.9	11.9	7.3	3.9	10.5	4.9	1.8
20	10.0	18.3	13.0	7.4	4.6	9.8	5.6	1.9
21	11.2	18.9	12.8	7.4	5.7	9.9	5.6	1.9
22	11.7	19.3	13.5	7.8	6.3	10.7	5.5	1.9
23	11.3	20.2	13.8	7.3	6.6	11.1	5.9	2.3
24	8.4	21.3	12.0	6.6	5.2	11.5	5.1	1.8
25	7.2	21.5	12.0	6.2	4.2	11.5	5.1	1.5
26	7.1	21.4	10.6	5.3	3.7	11.1	4.4	1.4
27	7.5	21.4	10.1	5.0	3.9	10.8	4.1	1.2
28	8.7	20.8	9.4	4.5	4.4	10.6	3.8	1.1
29	9.3	21.5	8.8	4.6	5.2	10.8	3.5	1.0
30	11.1	21.9	9.5	4.6	5.8	11.6	3.5	1.0
31		23.1		4.2		12.0		1.0
Total C.F.S.	234.7	552.8	441.0	233.7	131.9	289.5	204.3	70.3
Total Ac.-Ft.	464.7	1094.5	873.2	462.7	261.2	573.2	406.5	139.2

Table 10 (Cont'd)

UNIMPAIRED STREAMFLOW

Mean Daily Flows in Thousands of C.F.S.

Kaweah River at Terminus Dam

Day	April	May	June	July
1	2.5	3.0	6.8	3.0
2	2.5	3.1	6.7	2.9
3	2.7	2.7	6.3	2.9
4	2.2	2.5	5.9	2.8
5	3.4	2.4	5.6	2.7
6	3.2	2.7	5.5	2.6
7	2.4	3.1	5.3	2.5
8	2.2	3.7	4.8	2.5
9	2.1	4.2	4.3	2.4
10	2.0	4.6	3.4	2.4
11	2.1	4.5	2.9	2.3
12	2.4	4.4	2.8	2.3
13	2.4	4.5	3.0	2.6
14	2.4	4.4	3.4	2.4
15	2.1	4.3	3.6	2.2
16	2.0	4.6	3.9	2.1
17	2.1	5.1	3.7	2.1
18	2.4	5.2	3.2	2.0
19	2.3	5.0	3.3	2.0
20	2.6	5.0	3.5	2.0
21	3.0	5.3	3.4	2.0
22	3.3	5.4	3.7	1.9
23	3.1	5.0	3.7	1.8
24	2.6	5.6	3.6	1.7
25	2.3	5.8	3.3	1.5
26	2.2	5.7	3.1	1.4
27	2.3	5.7	3.0	1.4
28	2.5	5.6	2.9	1.4
29	2.7	6.0	2.8	1.3
30	2.9	6.4	2.9	1.3
31		6.8		1.2
Total C.F.S.	74.9	142.3	120.3	65.6
Total Ac.-Ft.	148.3	281.8	238.2	129.9

Kings River at Pine Flat Dam

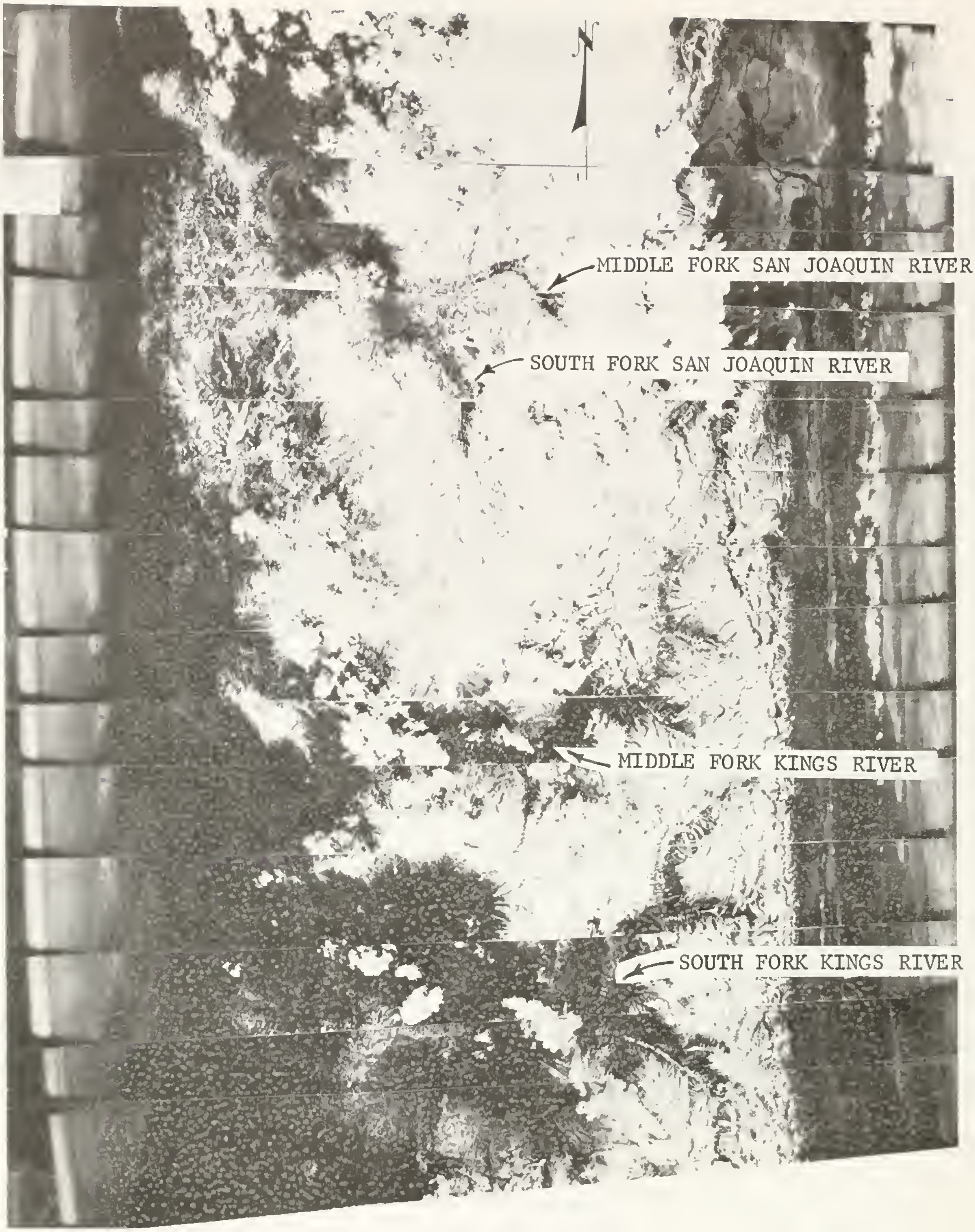
Day	April	May	June	July
1	6.1	10.9	28.3	12.7
2	6.1	10.8	28.5	12.7
3	6.1	10.0	28.0	12.4
4	5.2	8.9	26.2	12.6
5	7.1	8.4	25.2	11.6
6	6.6	10.1	24.7	11.2
7	5.3	11.6	23.2	10.9
8	4.7	14.7	21.5	10.6
9	4.8	16.2	18.9	10.6
10	4.4	17.9	14.0	10.8
11	4.8	18.3	12.7	10.1
12	5.7	18.1	12.7	10.1
13	7.7	18.7	14.0	12.1
14	5.8	18.5	16.6	11.3
15	5.1	17.6	16.4	10.2
16	4.7	17.9	17.5	9.6
17	5.4	19.3	14.7	9.3
18	6.1	19.8	12.6	9.1
19	6.4	19.1	15.1	9.5
20	7.5	18.7	17.1	9.5
21	9.0	19.8	15.8	10.0
22	9.6	21.0	17.7	9.5
23	10.0	20.9	17.3	8.3
24	7.8	22.7	16.3	7.8
25	6.8	23.8	15.5	6.9
26	6.6	23.7	13.5	6.2
27	7.2	23.3	13.0	5.9
28	8.1	22.6	12.1	5.5
29	9.3	24.1	11.7	6.0
30	10.1	25.5	12.6	5.8
31		27.2		5.7
Total C.F.S.	200.1	560.4	533.4	294.5
Total Ac.-Ft.	396.2	1,109.6	1,056.1	583.1

Table 10 (Cont'd)

UNIMPAIRED STREAMFLOW

Mean Daily Flows in Thousands of C.F.S.

	Kern River at Isabella Dam				Tule River at Success Dam			
Day	April	May	June	July	April	May	June	July
1	5.4	8.1	12.8	5.2	1.6	1.2	1.2	.5
2	5.2	8.3	12.7	4.9	1.6	1.2	1.2	.5
3	5.3	7.9	12.4	4.8	1.9	1.0	1.1	.4
4	4.5	7.6	12.0	4.6	1.4	1.0	1.1	.4
5	4.9	6.8	11.5	4.4	2.1	.9	1.0	.4
6	4.8	6.8	11.0	4.4	2.1	1.0	1.0	.4
7	4.0	7.4	10.5	4.2	1.6	1.1	1.0	.4
8	3.9	8.1	10.0	4.2	1.5	1.1	.9	.4
9	4.1	9.1	8.9	4.1	1.4	1.3	.9	.4
10	4.1	10.0	7.8	4.1	1.3	1.3	.9	4
11	4.6	10.2	7.1	3.9	1.4	1.4	.8	.3
12	5.0	9.8	7.1	3.9	1.5	1.3	.7	.4
13	5.7	9.5	7.0	4.2	1.4	1.3	.7	.3
14	5.6	9.8	7.3	4.8	1.4	1.3	.7	.4
15	5.2	9.5	7.6	4.0	1.3	1.2	.7	.3
16	5.0	9.5	8.0	3.9	1.2	1.2	1.1	.3
17	5.2	10.0	7.3	3.6	1.2	1.3	.8	.3
18	5.6	10.4	6.9	3.6	1.3	1.3	.7	.3
19	5.7	10.3	7.0	3.7	1.2	1.2	.7	.3
20	6.2	10.2	7.2	3.8	1.3	1.2	.7	.3
21	7.0	10.4	7.1	3.7	1.4	1.2	.7	.3
22	7.7	10.9	7.3	4.1	1.6	1.2	.6	.3
23	7.7	10.3	7.4	3.7	1.5	1.2	.6	.3
24	7.0	10.6	7.4	3.4	1.3	1.2	.6	.2
25	6.4	10.9	6.8	3.1	1.1	1.2	.6	.2
26	6.3	11.2	6.0	2.7	1.1	1.2	.6	.2
27	6.4	11.0	5.4	2.8	1.0	1.2	.5	.2
28	6.7	10.7	5.4	2.9	1.1	1.2	.5	.2
29	7.1	11.1	5.0	2.9	1.1	1.2	.5	.2
30	7.9	11.6	5.0	2.8	1.1	1.2	.5	.2
31		12.0		2.6		1.2		.2
Total C.F.S.	170.5	300.0	243.6	119.0	41.9	37.0	23.6	9.9
Total Ac.-Ft.	337.6	594.0	482.3	235.6	83.0	73.3	46.7	19.6

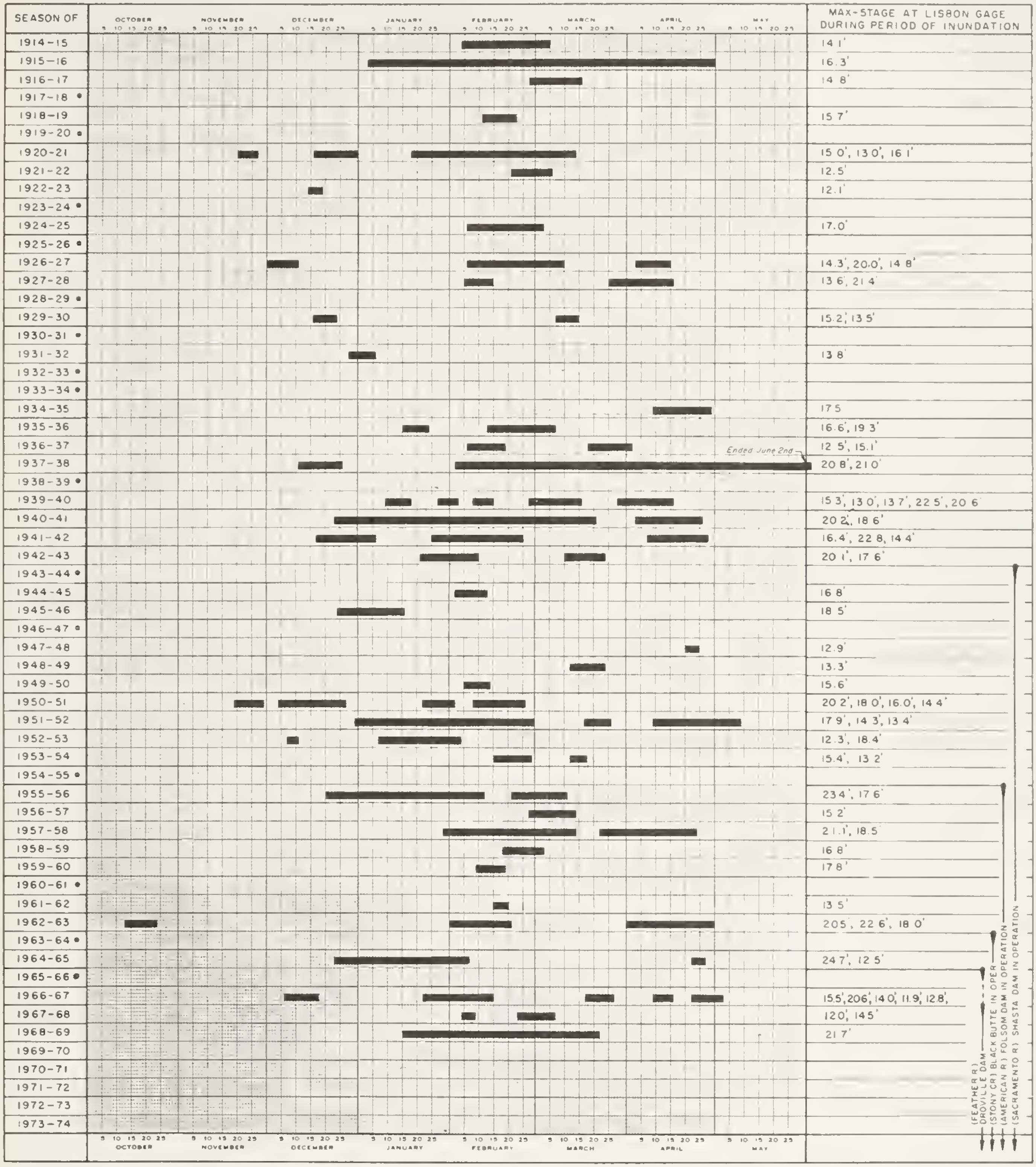


Photograph - Courtesy U. S. Air Force

High altitude photography is a new tool of the Federal-State River Forecast Center and is used to determine the area of snow coverage which will contribute to snowmelt runoff.

This photo, taken June 11, 1969, shows the snow covered San Joaquin River and Kings River basins in the Sierra Nevada.

PERIOD OF RECORD OF INUNDATION OF THE YOLO BYPASS



NOTE:

Data compiled from records of D W R stream gaging station "Yolo Bypass near Lisbon."

Datum: 0=U S E D Datum

Period of Record: 1914 to Present

Assumed overflow of Bypass at stage above 11 5' on the Lisbon gage

LEGEND

▬ Designates period of inundation of Bypass

• Designates season Bypass not inundated

REV 11/69

Table 11

Peak Flows and Stages
(Preliminary Data, Subject to Revision)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg. in cfs
North Coastal Area									
Smith River near Crescent City	609[r]	1931-	USGS	12/22/64	48.5	228,000	1/13/69	27.32	69,400
Shasta River near Yreka	793[r]	1933-41 1944-	USGS	12/22/64	12.92	21,500[c]	1/21/69	7.36	3,170
Scott River near Fort Jones	653[r]	1941-	USGS	12/22/64	25.0	54,600	1/21/69	12.42	6,980
Klamath River near Seiad Valley	6,980	1912-25 1951-	USGS	12/22/64	33.75	165,000[c]	1/21/69	11.27	16,000
Salmon River at Somesbar	746	*1911-	USGS	12/22/64	43.4[h]	133,000	1/21/69	13.59	23,100
Klamath River at Orleans	8,480	1927-	USGS	12/22/64	76.5[h]	307,000[c]	1/21/69	18.61	56,900
Trinity River above Coffee Creek, near Trinity Center	149	1957-	USGS	12/22/64	12.30	20,800	5/12/69	7.35	4,640
Trinity River at Lewiston	728[r]	1911-	USGS	12/22/55	27.3[h]	71,600	6/6/69	5.14	1,440
North Fork Trinity River at Helena	151	1911-13 1957	USGS DWR	12/22/64	27.93[h]	35,800	1/21/69	15.11	5,830
Trinity River near Burnt Ranch	1,439[r]	1931-40 1956	USGS	12/22/55	43.2[h]	172,000	1/13/69	11.84	11,300[c]
New River at Denny	173	1927-28 1959-	USGS	12/22/64	38.7[h]	60,000[e]	1/21/69	17.24	8,440
Hayfork Creek near Hyampom	378[r]	1956-	USGS	12/22/64	19.14	28,800	1/20/69	14.04	13,800
South Fork Trinity River near Salyer	898[r]	1911-13 1950-	USGS	12/22/64	47.6	95,400	DISCONTINUED		
Willow Creek near Willow Creek	43.3	1959-	USGS	12/22/64	25.3[h]	17,000[e]	1/20/69	8.31	2,480
Trinity River at Hoopa	2,847[r]	*1911-	USGS	12/22/64	40.3	231,000[c]	1/21/69	36.17	71,400[c]
Klamath River near Klamath	12,100	*1910-	USGS	12/23/64	55.3	557,000[c]	1/21/69	26.87	177,000[c]
Redwood Creek at Orick	278	1911-13	USGS	12/22/64	24.0	50,500	1/13/69	14.47	20,100
Little River at Crannel	44.3	1955-	USGS	1/ 4/66	11.12	8,300	1/13/69	6.93	3,430

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg. in cfs
North Coastal Area (Continued)									
Mad River near Forest Glen	143	1953-	USGS	12/22/55	24.5	39,200	1/13/69	11.73	11,100[c]
Mad River near Arcata	484	1910-13 1950-	USGS	12/22/55	27.30[b]	77,800	1/20/69	18.66	32,700
Elk River near Falk	44.2	1957-	USGS	12/22/64	28.09	3,430	DISCONTINUED		
Eel River below Scott Dam, near Potter Valley	290	1922-	USGS	12/22/64	24.24[h]	56,300[h]	1/13/69	17.33	20,300[c]
Eel River at Van Arsdale Dam, near Potter Valley	349	*1909-	USGS	12/22/64	33.9[h]	64,100[c]	1/13/69	21.74	22,300[c]
Outlet Creek near Longvale	161[r]	1956-	USGS	12/22/64	30.6[h]	77,900	1/13/69	14.95	17,100
Black Butte River near Covelo	162	*1951-	USGS	12/22/64	26.4[h]	29,000	1/19/69	22.10	13,800
M. F. Eel River below Black Butte River near Covelo	367	1951-	USGS	12/22/64	31.7[h]	133,000	DISCONTINUED		
Eel River below Dos Rios	1,484	1911-13 1951-	USGS	12/22/64	62.5[h]	460,000[c]	DISCONTINUED		
North Fork Eel River near Mina	250	1953-	USGS	12/22/64	34.5[h]	133,000	1/22/69	19.00	33,300
Eel River at Fort Seward	2,079	1955-	USGS	12/22/64	87.2[h]	561,000[c]	1/21/69	36.55	118,000[c]
South Fork Eel R. nr. Branscomb	43.9	1946-	USGS	12/22/55	16.20	20,100	1/12/69	9.01	5,350
Tenmile Creek near Laytonville	50.3	1957-	USGS	12/22/55	22.9[h]	16,300	12/23/68	13.29	6,190
South Fork Eel River near Miranda	537	1939-	USGS	12/22/64	46.0[h]	199,000	1/13/69	24.79	74,500
Bull Creek near Weott	28.1	1960-	USGS	12/22/64	20.6[h]	6,520	12/24/68	11.84	3,970
Eel River at Scotia	3,113	*1910-	USGS	12/23/64	72.0[h]	752,000[c]	1/13/69	37.90	194,600
South Fork Van Duzen River nr. Bridgeville	36.2	*1951-	USGS	12/22/64	18.70	13,600	DISCONTINUED		
Van Duzen River near Bridgeville	216	1950-	USGS	12/22/64	22.6	48,700	1/13/69	19.30	31,000

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg. in cfs
North Coastal Area (Continued)									
Mattole River near Petrolia	240	*1911-	USGS	12/22/55	29.60	90,400	1/12/69	22.17	53,800
Noyo River near Fort Bragg	106	1951-	USGS	12/22/64	26.30	24,000	1/12/69	20.13	9,300
Rancheria Creek near Boonville	65.6	1959-	USGS	12/22/64	20.52	20,000	DISCONTINUED 9/30/68		
Navarro River near Navarro	303	1950-	USGS	12/22/55	40.60	64,500	1/13/69	27.70	20,400
South Fork Gualala River near Annapolis	161	1950-	USGS	12/22/55	24.57	55,000	1/13/69	18.54	29,100
Russian River near Ukiah	99.7	*1911-	USGS	12/21/55	21.0	18,900	12/23/68	12.29	8,720
East Fork Russian River near Calpella	93.0	1941-	USGS	12/22/64	20.21	18,700[c]	1/13/69	15.95	6,060[c]
Russian River near Hopland	362	1939-	USGS	12/22/55	27.00	45,000	12/23/68	17.67	17,600[c]
Feliz Creek near Hopland	31.1	1958-	USGS	12/22/64	14.10	6,080	DISCONTINUED		
Russian River near Cloverdale	502	1951-	USGS	12/22/64	31.60	55,200[c]	1/13/69	21.32	24,000[c]
Big Sulphur Creek near Cloverdale	82.3	1957-	USGS	12/22/55	22.2[h]	20,000	1/13/69	12.33	9,660
Russian River near Healdsburg	793	1939-	USGS	12/23/64	27.00	71,300[c]	1/13/69	19.38	39,200[c]
Dry Creek near Cloverdale	87.8	1941-	USGS	12/22/64	18.09	18,100	12/24/68 1/13/69	12.07	8,700
Dry Creek near Geyserville	162	1959-	USGS	1/31/63	17.50	32,400	1/13/69	14.00	16,200
Santa Rosa Creek near Santa Rosa	12.5	1959-	USGS	2/ 8/60	13.35	3,200	1/13/69	9.03	1,070
Russian River near Guerneville (Summerhome)	1,340	*1939-	USGS	12/23/64	49.6	93,400[c]	1/14/69	42.52	68,600[c]
Austin Creek near Cazadero	63.1	1959-	USGS	2/13/62	20.6[j]	15,100	DISCONTINUED		
San Francisco Bay Area									
Walker Creek near Tomales	37.1	1959-	USGS	1/ 5/66	22.23	5,420	1/13/69	20.47	4,060
Corte Madera Creek at Ross	18.1	1951-	USGS	12/22/55	17.45	3,620	1/13/69	12.84	1,750[c]

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record (a)	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg in cfs	Date	Stage in ft.	Dischg. in cfs
San Francisco Bay Area									
Novato Creek near Novato	17.5	1946-	USGS	1/20/64	8.74	1,330	1/26/69	7.81	2,500[c]**
Sonoma Creek near Aqua Caliente	62.2	1955-	USGS	12/22/55	17.10	8,880	1/13/69	15.15	6,200
Napa River near St. Helena	81.4[r]	*1929-	USGS	12/22/55	16.17	12,600	1/13/69	11.94	6,580
Dry Creek near Napa	17.4	1951-	USGS	2/24/58	8.11	3,460	DISCONTINUED		
Napa River near Napa	218	*1929-	USGS	1/31/63	27.59	16,900	1/13/69	19.78	9,520[c]
Redwood Creek near Napa	9.81	1958-	USGS	1/ 5/65	10.44	1,450	1/13/69	8.18	972
San Ramon Creek at San Ramon	5.89	1952-	USGS	10/13/62	16.98	1,600	1/26/69	5.05	407
San Ramon Creek at Walnut Creek	50.8	1952-	USGS	1/31/63	14.40	7,980	1/26/69	9.57	3,350
Walnut Creek at Walnut Creek	79.2	1952-	USGS	4/ 2/58	20.2	12,200	1/26/69	7.54	4,960[c]
San Lorenzo Creek at Hayward	37.5	*1939-	USGS	10/13/62	19.73[h]	7,460	1/26/69	10.33	1,410[c]
Arroyo Mocho near Pleasanton	143	1962-	USGS	2/ 1/63	8.60	1,760	1/26/69	14.60	1,070
Arroyo Valle near Livermore	147	*1912-	USGS	12/23/55	13.93[h]	18,200	3/2/69	4.88	885[c]
Arroyo Valle at Pleasanton	171	1957-	USGS	3/ 2/48	25.36	11,300	3/3/69	11.43	897[c]
Alameda Creek near Niles	633	1891-	USGS	12/23/55	14.9	29,000[c]	1/26/69	8.44	6,300[c]
Patterson Creek at Union City	-	1958-	USGS	2/ 1/63	20.4[h]	10,500[c]	1/19/69	12.51	4,760[c]
Alameda Creek at Union City	653	1958-	USGS	2/ 1/63	19.25[h]	1,770[c]	1/25/69	9.40	5[c]
Coyote Creek near Madrone	196	*1902-	USGS	3/ 7/11	-	25,000	2/25/69	8.16	3,570
Upper Penitencia Creek at San Jose	21.5	1961-	USGS	1/21/67	6.24	1,500[c]	1/24/69	4.71	386[c]
Alamitos Creek near New Almaden	31.9	1958-	USGS	4/ 2/58	9.67	4,300[c]	1/26/69	5.63	2,200[c]
Los Gatos Creek at Los Gatos	38.6	*1929-	USGS	2/27/40	14.71[b]	7,110	1/15/69	7.51	1,450[c]

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg. in cfs
San Francisco Bay Area (Continued)									
Guadalupe River at San Jose	146	1929-	USGS	4/ 2/58	16.55	9,150[c]	1/26/69	7.39	3,840[c]
Saratoga Creek at Saratoga	9.22	1933-	USGS	12/22/55	6.40	2,730	1/26/69	Unknown	1,120[c]
Matadero Creek at Palo Alto	7.24	1952-	USGS	12/22/55	9.60[b]	854	1/26/69	4.74	792
San Francisquito Creek at Stanford University	37.5	*1930-	USGS	12/22/55	13.60	5,560	2/5/69	6.28	2,300[c]
Redwood Creek at Redwood City	1.82	1959-	USGS	1/31/63	9.36	644	2/5/69	6.28	313
Pescadero Creek near Pescadero	45.9	1951-	USGS	12/23/55	21.27	9,420	1/19/69	11.97	2,900
Central Coastal Area									
San Lorenzo River at Big Trees	111	1936-	USGS	12/23/55	22.55	30,400	2/15/69	14.97	11,500
Branciforte Creek at Santa Cruz	17.3	1940-43 1952-	USGS	12/22/55	22.04	8,100	DISCONTINUED 9/30/69		
Soquel Creek at Soquel	40.2	1951-	USGS	12/23/55	22.33	15,800	2/15/69	10.76	3,230
Llagas Creek near Morgan Hill	19.6	1951-	USGS	4/ 2/58	8.45	3,190[c]	1/26/69	5.86	1,280[c]
Bodfish Creek near Gilroy	7.40	1959-	USGS	1/31/63	8.25	1,240	1/19/69	7.11	638
Tres Pinos Creek near Tres Pinos	206	1939-	USGS	4/ 4/41	7.75	8,060	2/24/69	9.49	5,520
San Benito River near Hollister	586	1949-	USGS	4/ 3/58	16.30	11,600	2/24/69	16.10	8,900[c]
Pajaro River at Chittenden	1,186	1939-	USGS	12/24/55	32.46	24,000[c]	2/25/69	23.92	14,000[c]
Corralitos Creek near Corralitos	10.6	1957-	USGS	4/ 2/58	7.55	1,970	1/18/69	5.13	646
Corralitos Creek at Freedom	27.8	1956-	USGS	12/22/55	15.6[h]	3,620	1/19/69	8.11	1,320
Salinas River near Pozo	74.1	1942-	USGS	12/ 6/66	14.23	14,200	1/25/69	13.90	18,600**
Salinas River above Philitas Creek near Santa Margarita	114	1942-	USGS	12/ 6/66	12.45	11,000[c]	1/25/69	14.93	14,600**

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg. in cfs
Central Coastal Area (Continued)									
Jack Creek near Templeton	25.3	1949-	USGS	12/ 6/66	9.58	5,100	2/24/69	11.28	8,160**
Estrella River near Estrella	924[r]	1954-	USGS	12/ 6/66	10.2	17,600	2/24/69	10.5	28,400**
Nacimiento River near Bryson	140	1955-	USGS	12/23/55	24.63	30,300	1/25/69	24.60	39,100**
Salinas River near Bradley	2,536[r]	1948-	USGS	12/ 7/66	16.24	34,200[c]	2/24/69	20.34	117,000[c]**
Arroyo Seco near Soledad	244	1901-	USGS	4/ 3/58	16.40	28,300	1/26/69	15.0	24,000
Salinas River near Spreckels	4,157[r]	*1900-	USGS	2/12/38 1/16/52	25.0 26.85	75,000[c] -	2/26/69	26.5	82,700[c]**
Big Sur River near Big Sur	46.5	1950-	USGS	4/ 2/58	11.56	5,680	1/26/69	9.58	3,900
Arroyo de la Cruz near San Simeon	41.4	1950-	USGS	12/ 6/66	15.27	34,100	1/19/69	13.45	23,700
Santa Rosa Creek near Cambria	12.5	1957-	USGS	2/ 1/60 12/ ?/55	10.36 15.2[h]	2,520 -	1/25/69	12.20	3,400**
Sisquoc River near Garey	472	1940-	USGS	12/ 6/66	13.5	22,600	1/25/69	13.0	24,500**
Santa Maria River at Guadalupe	1,742	1940-	USGS	1/16/52	8.18[b]	32,800	2/25/69	10.0	26,500
Santa Ynez River below Gibraltar Dam, near Santa Barbara	216	1920-	USGS	3/ 2/38	-	35,500[c]	1/25/69	25.8	54,200**
Santa Cruz Creek near Santa Ynez	73.9	1941-	USGS	12/ 6/66	10.30	5,750	2/24/69	11.2	6,900**
San Jose Creek near Goleta	5.51	1941-	USGS	4/ 4/41	-	1,960	1/25/69	10.10	2,000**
Atascadero Creek near Goleta	18.8[r]	1941-	USGS	11/16/65	12.78	4,600	1/25/69	13.1	5,500**
Carpinteria Creek near Carpinteria	13.1	1941-	USGS	12/ 6/66	8.60	2,720	1/25/69	14.90	4,900**
South Coastal Area									
Matilija Creek at Matilija Hot Springs	54.6	1927-	USGS	3/ 2/38	-	15,900	1/25/69	16.5	20,000**
Ventura River near Meiners Oaks	76.4	1959-	USGS	12/29/65	*	7,910[c]	Destroyed by Flood 1/25/69		
Coyote Creek near Oak View	13.2	1958-	USGS	12/ 6/66	9.08	5,010	1/25/69	12.0	8,000**

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg. in cfs
South Coastal Area (Continued)									
Ventura River near Ventura	188	1911-14 1929-	USGS	3/ 2/38	19.2	39,200	1/25/69	27.41	52,900**
Santa Clara River at Los Angeles-Ventura County Line	644	1952-	USGS	12/29/65	11.50	34,100	1/25/69	19.01	82,000**
Piru Creek above Lake Piru	372	1955-	USGS	2/10/62 3/ 2/38	12.20 -	12,200 35,000[b]	2/25/69	19.10	31,200
Seape Creek near Fillmore	251	1911-13 1927	USGS	3/ 2/38	-	56,000	1/25/69	20.80	60,000**
Santa Paula Creek near Santa Paula	40.0	1927-	USGS	3/ 2/38	10.56	13,500	2/25/69	15.18	21,000**
Malibu Creek at Crater Camp near Calabasas	105	1931-	USGS	12/29/65	-	20,600	1/25/69	21.41	33,700**
Ballona Creek near Culver City	89.5[r]	1928-	USGS	11/21/67	14.9	32.490	1/25/69		17,200
Los Angeles River at Sepulveda Dam	158	1929-	USGS	12/29/65	10.90	13,000[c]	1/25/69	11.43	13,800**
Los Angeles River at Los Angeles	514	1929-	USGS	3/ 2/38	-	67,000[c]	1/25/69		41,800
Rio Hondo near Downey	143	1928-	USGS	3/ 2/38	12.0	24,400[c]	1/25/69		42,200**
Santa Ana River near Mentone	209[r]	1896-	USGS	3/ 2/38	14.3	52,300	1/25/69	14.68	15,300
San Gabriel River below Santa Fe Dam near Baldwin Park	236[r]	1942-	USGS	11/23/67	17.14	11,100[c]	1/26/69	22.20	30,900**
Santa Ana River at "E" Street near San Bernardino	332	1939	USGS	1/23/43	16.5	--	2/25/69	11.9	28,000
Mill Creek near Yucaipa	38.1	1919-38 1947-	USGS	3/ 2/38	-	18,100	1/25/69	16.8	35,400**
Lytle Creek near Fontana	46.3	1918-	USGS	3/ 2/38	-	25,200	1/25/69	15.0	40,200**
Cajon Creek near Keenbrook	40.6	1919-	USGS	3/ 2/38	19.3	14,500	2/25/69	9.70	8,980
Santa Ana River at Riverside Narrows near Arlington	851[r]	1927-	USGS	3/ 2/38	-	100,000	1/25/69	15.23	41,000

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg. in cfs
South Coastal Area (Continued)									
San Jacinto River near San Jacinto	141	1920-	USGS	2/16/27	-	45,000	1/25/69	10.15	7,410
Santiago Creek at Modjeska	12.5	1961-	USGS	11/22/65	6.60	1,500	2/25/69	6.18	6,520**
Santiago Creek at Santa Ana	95.0	1928-	USGS	3/ 2/38	8.36	4,400[c]	2/25/69	9.10	6,600**
San Juan Creek near San Juan Capistrano	106	1928-	USGS	3/ 2/38	-	13,000	2/25/69	5.6	22,400**
San Mateo Creek near San Clemente	80.8	1952-	USGS	12/ 6/66	10.45	7,300	DISCONTINUED		
San Mateo Creek at San Onofre	132	1946-	USGS	12/ 6/67	7.80	6,950	DISCONTINUED		
Santa Margarita River near Temecula	588	1923-	USGS	2/16/27	14.6	25,000	2/25/69	15.32	14,600
Santa Margarita River at Ysidora	739	1923-	USGS	2/16/27	18.00[b]	33,600	2/25/69	15.89	19,200
San Luis Rey River at Monserate Narrows, near Pala	373	1935-41 1946-	USGS	12/ 6/66	6.70	7,000	2/25/69	7.26	3,200[c]
San Luis Rey River near Bonsall	512	1916-18 1929-	USGS	3/ 2/38 2/1891	12.60[b] -	18,100[c] 128,100	2/25/69	11.42	6,640
Santa Ysabel Creek near Ramona	112	1912-23 1943-	USGS	1/27/16	14.0[b]	28,400	1/25/69	11.55	6,180
Santa Ysabel Creek near San Pasqual	128	*1905-	USGS	3/24/06	6.3[b,m]	8,000	1/25/69	12.19	7,120
San Diego River near Santee	377	1912-	USGS	1/27/16	25.1[b]	70,200	2/25/69	7.59	1,590
Sweetwater River near Descanso	45.5	1905-27 1956-	USGS	2/16/27	13.2[b,h]	11,200	2/25/69	7.62	1,750
Tijuana River near Dulzura	481	1936	USGS	2/ 7/37	8.5	4,700[c]	2/26/69	5.45	1,330
Central Valley Area									
Sacramento River at Delta	425[r]	1944-	USGS USBR	12/22/64	20.10	38,800	2/11/69	12.38	14,200
N. F. Pit River near Alturas	203[r]	1929-32 1957-	USGS	10/14/62	11.07	2,530	DISCONTINUED		
Pit River near Bieber	2,475	*1904-	USGS	3/19/07	16.7	33,800	1/22/69	8.80	6,300

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg. in cfs
Central Valley Area (Continued)									
Squaw Creek above Shasta Lake	64.0[r]	1944-	USGS USBR	12/21/55	21.90	17,800	DISCONTINUED		
McCloud River above Shasta Lake	604[r]	1945-	USGS USBR	12/22/55	28.20	45,200	1/21/69	22.30	20,700
Sacramento River at Keswick	6,486[r]	1938-	USGS DWR	2/23/40	47.2[b]	186,000	1/21/69	27.92	56,000
Clear Creek at French Gulch	115	1950-	USGS	12/22/64	13.70	7,600	1/21/69	9.02	2,920
Clear Creek near Igo	228	1940-	USGS	12/21/55	13.75	24,500	1/13/69	6.64	3,580
Cow Creek near Millville	425	1949-	USGS	12/27/51	21.55	45,200	1/12/69	17.57	33,800
Cottonwood Creek near Cottonwood	922	1940-	USGS	12/22/64	19.64	56,500	1/13/69	15.18	23,700
Battle Creek below Coleman Fish Hatchery near Cottonwood	358	1961-	USGS	12/11/37	15.8[h,b]	35,000	1/20/69	13.54	12,100
Sacramento River at Bend Bridge	--	1960-	DWR	12/ /64	55.0[e]	--	1/22/69	37.43	96,090
Paynes Creek near Red Bluff	92.7	1949-	USGS	12/ 1/61	11.33	10,600	1/21/69	9.83	7,200
Red Bank Creek near Red Bluff	93.5	1959-	DWR USBR	1/ 5/65	10.21	12,200	1/12/69	9.23	6,540
Antelope Creek near Red Bluff	123	1940-	USGS USCE	2/22/56	12.43	11,500	1/21/69	13.25	9,430
Elder Creek near Paskenta	92.9[r]	1948-	USGS	2/24/58	13.90	11,700	1/19/69	8.37	3,840
Elder Creek at Gerber	136	1949-	USBR USGS	1/ 5/65	14.90	14,100	1/19/69	11.32	6,380
Mill Creek near Los Molinos	131	*1909-	USGS	12/11/37	23.4[h]	23,000	1/21/69	13.14	--
Thomes Creek at Paskenta	194	1920-	DWR USGS	12/22/64	15.32	37,800	1/20/69	9.80	9,300
Deer Creek near Vina	208	*1911-	USGS DWR	12/10/37	19.2[h]	23,800	1/21/69	13.28	15,000
Sacramento River at Vina Bridge	-	1945-	DWR USBR	12/23/64	90.92	152,000[c]	1/13/69	88.64	139,400
Sacramento River at Hamilton City	-	1945-	DWR USBR	12/11/37	150.7	350,000	1/13/69	47.60	- -
Big Chico Creek near Chico	72.5	1930-	USGS	1/ 5/55	15.36	9,580	1/21/69	13.69	7,740

Stream and Station	Drainage Area in Sq. Mi	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Dischg in cfs
Central Valley Area (Continued)									
Stony Creek near Fruto	599	1901-12 1960-	USGS	12/23/64	15.49	40,200[c]	1/21/69	11.73	13,600[c]
Stony Creek near Hamilton City	777	1940-	USGS	2/25/58	18.31	39,900[c]	1/22/69	12.14	10,100
Sacramento River at Ord Ferry	-	*1921-	DWR	2/28/40	121.7	370,000	1/14/69	117.29	- -
Sacramento River at Butte City	-	*1921-	DWR USGS	2/ 7/42	96.87	170,000	1/14/69	93.30	- -
Moulton Weir Spill to Butte Basin	-	*1935-	DWR	2/20/58 2/26/58	83.66 83.66	36,000[d] 36,000[d]	1/14/69	81.42	18,200
Colusa Weir Spill to Butte Basin	-	*1935-	DWR	2/ 8/42	70.40	86,000[d]	1/23/69	66.70	53,600
Sacramento River at Colusa	-	1940-	DWR USGS	2/ 8/42	69.20	49,000[c]	1/23/69	65.66	42,700
Colusa Basin Drain at Highway 20	-	1924-	DWR	2/21/58	51.93	25,400[e]	2/18/69	50.96	5,150
Butte Creek near Chico	14[illegible]	1930-	USGS	12/22/64	14.12	21,200	1/21/69	12.44	12,900
Butte Slough to Sutter Bypass at Mawson Bridge	-	*1934-	DWR	3/ 1/40	68.9	210,000	DISCONTINUED		
Butte Slough near Meridian	--	1968	DWR				1/24/69	58.30	83,400
Sutter Bypass at Long Bridge	-	1914-	DWR	3/ 1/40	57.7	210,000	1/24/69	51.72	--
Tisdale Weir Spill to Sutter Bypass	-	1940-	DWR	3/ 1/40	53.35	25,700[d]	1/24/69	49.68	14,000
Sacramento River below Wilkins Slough	-	1938-	USGS	2/27/58	51.41	28,900[c]	1/23/69	49.5	29,000**
Sacramento River at Knights Landing	-	1940-	DWR USGS	12/ 3/60 12/ 8/42	30.31 41.83[k]	30,000[c]	1/23/69	39.2	30,600**
Middle Fork Feather River near Clio	686	1925-	USGS	2/ 1/63	16.19	14,500	1/21/69	14.74	10,900
Middle Fork Feather River near Merrimac	1,062[r]	1951-	USGS	12/22/64	26.5[h]	86,200	1/21/69	17.85	30,300
North Fork Feather River near Prattville	493	*1905-	USGS	3/19/07	16.2[b]	10,000	3/20/69	5.50	1,000[c]
Butte Creek below Almanor-Butte Creek Tunnel, near Prattville	68.8	1936-	USGS	12/23/64	5.87	3,830	1/21/69	3.03	1,060
Indian Creek near Crescent Mills	739	*1906-	USGS	3/19/07	20.2[b,m]	25,000	1/21/69	15.81	18,300

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs	Date	Stage in ft.	Disc g. in cfs
Central Valley Area (Continued)									
Spanish Creek above Blackhawk Creek, at Keddie	184	1933-	USGS	12/22/64	13.53	15,400	1/21/69	12.05	12,300
North Fork Feather River at Pulga	1,953	*1910-	USGS	12/22/64	35.80	73,000[c,g]	1/21/69	28.69	46,900[c]
West Branch Feather River near Paradise	113	1957-	USGS DWR	12/22/64	26.2	25,500	1/20/69	19.42	15,000
Feather River at Oroville	3,626[r]	1901-	USGS DWR	3/19/07	39.3[b,m]	230,000	1/21/69	14.10	50,500
Feather River near Gridley	-	*1929-	DWR q	12/23/55	102.25	-	1/22/69	40.20	56,400[c]
South Honcut Creek near Bangor	30.6[r]	1950-	USGS	12/26/64	19.25	17,000	1/21/69	9.74	4,500
Feather River at Yuba City	-	1944-	DWR	12/24/55	82.42	-	1/22/69	61.88	--
Middle Yuba River above Oregon Creek	162	1940-	USGS	1/31/63	18.55	31,600[c]	1/20/69	12.09	11,300[c]
Oregon Creek near North San Juan	34.4	1911-	USGS	12/22/64	12.88	10,300	1/20/69	9.31	3,490
North Yuba River below Goodyears Bar	250	*1930-	USGS	2/ 1/63	23.8[h]	40,000	1/21/69	14.55	14,300
North Yuba River below Bullards Bar Dam	487	1940-	USGS	12/22/64	40.45	91,600[c]	1/26/69	--	20,700[c]
South Yuba River near Cisco	51.8	1942-	USGS	1/31/63	20.6[h]	18,400	1/20/69	7.96	2,460
South Yuba River at Jones Bar, near Grass Valley	310	1940-48 1959-	USGS	12/22/64	25.0	53,600[c]	1/20/69	15.17	13,800[c]
Yuba River at Englebright Dam	1,109[r]	1941-	USGS PG&E	12/22/64	546.0[n]	171,700[c,f]	1/26/69	534.63	36,800[c,f]
Deer Creek near Smartville	84.6	1935-	USGS	10/13/62	13.77	11,600[c]	1/20/69	10.34	6,150[c]
Yuba River near Marysville	1,340	*1940-	USGS	12/23/64	90.15	180,000[c]	1/21/69	75.10	44,200
Bear River near Auburn	140	1940-	USGS	12/22/55	16.56[b]	19,700	DISCONTINUED		
Bear River near Wheatland	292	1928-	USGS	12/22/55	19.30[b]	33,000	1/20/69	13.3[e]	20,000[c]
Feather River at Nicolaus	5,923[r]	1943-	USGS DWR	12/23/55	51.60	357,000[c]	1/22/69	43.60	88,400

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Sources of Record (a)	Previous Maximum of Record: Date	Previous Maximum of Record: Stage in ft.	Previous Maximum of Record: Dischg. in cfs	1968-69 Water Year: Date	1968-69 Water Year: Stage in ft.	1968-69 Water Year: Dischg. in cfs.
Central Valley Area (Continued)									
Fremont Weir (West End) Spill to Yolo Bypass	-	*1935-	DWR	12/23/55	39.72	293,800[d]	1/23/69	37.37	--
Sacramento River at Verona	-	1929-	USGS DWR	3/ 1/40	41.20	79,200[c]	1/26/69	37.11	68,500
Sacramento Weir Spill to Yolo Bypass, near Sacramento	-	*1939-	USGS DWR	3/26/28 12/23/55	31.83 33.01	118,000[d] -	N		
North Fork American River at North Fork Dam	343	1941-	USGS	12/23/64	11.87	65,400[c]	1/20/69	7.74	27,300[c]
Rubicon River near Foresthill	311	1958-	USGS	12/23/64	74[b,h]	-	1/21/69	14.00	12,700
Middle Fork American River near Foresthill	534	1958-	USGS	12/23/64	69[b,h]	-	1/21/69	16.85	20,500
Middle Fork American River near Auburn	613	1911-	USGS	12/23/64	60.4[h]	250,000[b]	1/20/69	23.1	27,700
South Fork American River near Camino	501	1922-	USGS PG&E	12/23/55	32.6[h]	49,800[c]	1/21/69	17.24	8,130[c]
South Fork American River near Lotus	673	1951-	USGS	12/23/55	21.37	71,800[c]	1/21/69	13.55	21,800[c]
American River at Fair Oaks	1,888[r]	1904-	USGS	11/21/50	31.85[b]	180,000	1/23/69	15.64	73,400[c]
Sacramento River at Sacramento	23,530	*1879-	USGS DWR USWB	11/21/50	30.14[b]	104,000[c]	1/21/69	28.18	97,300
Sacramento River at Walnut Grove	-	1929-	DWR	11/21/50	13.0[b]	-	1/23/69	11.34	--
Adobe Creek near Kelseyville	6.39	1954-	USGS	12/22/64	9.11	1,500	1/13/69	7.94	996
Kelsey Creek near Kelseyville	37.2	1946-	USGS	12/21/55	12.80	8,800	1/26/69	10.59	4,150
Cache Creek near Lower Lake	528	1944-	USGS	2/24/58	9.40	8,000[c]	1/26/69	7.92	4,760[c]
North Fork Cache Creek near Lower Lake	198	1930-	USGS	12/11/37	13.98[h]	20,300	1/13/69	9.40	9,620
Cache Creek above Rumsey	-	1959-	DWR	1/ 5/65	21.4	59,000[c]	1/21/69	14.63	20,100[c]
Cache Creek near Capay	1,042[r]	1942-	USGS	2/24/58	20.90	51,600[c]	1/21/69	14.35	17,600
Cache Creek at Yolo	1,138[r]	1903-	USGS	2/25/58	33.11[b]	41,400[c,g]	1/21/69	22.36	15,900
Yolo Bypass near Woodland	-	1939-	USGS DWR	2/ 8/42	32.00	272,000	1/27/69	28.74	112,000

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs.	Date	Stage in ft.	Dischg. in cfs
Central Valley Area (Continued)									
Dry Creek near Middletown	8.41	1959-	USGS	2/ 8/60	9.90	3,470	1/13/69	8.06	1,570
Putah Creek near near Winters	5.74[r]	1930-	USGS DWR	2/27/40	30.5	81,000	2/15/69	14.72	6,410
Yolo Bypass near Lisbon	-	1914-	DWR	12/25/64	24.68	350,000[e]	1/23/69	21.72	--
Sacramento River at Rio Vista	-	1906-	USCE DWR	12/25/55	10.2[b]	-	2/15/69	8.98	--
North Fork Cosumnes River near El Dorado	205	1911-41 1948	USGS	12/23/55	14.8	15,800[c]	1/21/69	11.75	9,100[c]
Middle Fork Cosumnes River near Somerset	107	1957-	USGS	2/ 1/63	16.20	11,800	1/21/69	--	8,060
South Fork Cosumnes River near River Pines	64.3	1957-	USGS	2/ 1/63	10.90	5,540	1/21/69	7.09	2,810
Cosumnes River at Michigan Bar	536[r]	1907-	USGS DWR	12/23/55	14.59	42,000	1/21/69	10.88	22,500
Cosumnes River at McConnel	724	1941-	USGS USBR DWR	12/23/55	46.26	54,000	1/22/69	44.96	20,700
Cole Creek near Salt Springs Dam	20.4	1927-42 1943-	USGS	12/23/64	10.21	6,140	5/9/69	4.94	945
South Fork Mokelumne River near West Point	75.1[r]	1933-	USGS	12/23/55	14.8[b,h]	6,920	1/21/69	9.87	4,420
Mokelumne River near Mokelumne Hill	544[r]	(1901-	USGS	12/ 3/50	18.5	33,700[c]	1/21/69	13.31	17,200[c]
Mokelumne River at Woodbridge	661[r]	1924-	USGS	11/22/50	29.58	27,000[c]	1/31/69	22.72	4,660[c]
Mokelumne River near Thornton (Benson's Ferry)	2,045	1959-	DWR	12/24/55	18.00[b]	-	1/22/69	13.81	--
Bear Creek near Lockeford	47.6[r]	1930-	USGS	4/ 3/58	15.13	2,930	1/25/69	12.85	760
South Fork Calaveras River near San Andreas	118	1950-	USGS	12/23/55	10.29	17,600	1/21/69	9.48	9,930
Cosgrove Creek at Valley Springs	21.1[r]	1929-	USGS	12/23/55	8.96	3,240	2/15/69	6.35	1,350
Calaveras River at Bellota	-	1958-	DWR	4/ 2/58	10.3	1,570[c]	DISCONTINUED		
Dry Creek near Galt	329	1926-33 1944-	USGS USBR DWR	4/ 3/58	15.28	24,000	1/22/69	14.27	7,670

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs.	Date	Stage in ft.	Dischg. in cfs
Central Valley Area (Continued)									
Mormon Slough at Bellota	-	1948-	DWR	4/ 2/58	20.65	15,400[c]	1/25/69	12.25[e]	10,360[e]
Calaveras River near Stockton	-	1958-	DWR	1/22/67	10.27	680[c]	1/25/69	6.95[e]	292[e]
Stockton Diverting Canal at Stockton	-	1944-	DWR	4/ 4/58[e]	17.18[e]	11,400[e]	1/25/69	15.12[e]	10,500[e]
Duck Creek near Stockton	-	1950-	DWR	1/30/67	5.85	640	1/25/69	5.49	477
South Fork Stanislaus River near Long Barn	66.9[r]	1937-	USGS	11/21/50	9.3	4,900[c]	6/2/69	6.07	1,520
Stanislaus River below Melones Powerhouse, near Sonora	905[r]	1931-	USGS	12/23/55	29.0[h]	62,800[c]	Temporarily Discontinued because of Construction		
Stanislaus River at Orange Blossom Bridge	-	1940-	DWR	11/21/50	30.05	52,000[c]	1/22/69	23.1	28,830
Stanislaus River at Ripon	1,075	1940-	USGS DWR	12/24/55	63.25	62,500[c]	1/22/69	60.43	26,800
South Fork Tuolumne River near Oakland Recreation Camp	87.0[r]	1923-	USGS	12/23/55	10.9[h]	11,900	1/21/69	9.12	5,540
Middle Tuolumne River at Oakland Recreation Camp	73.5[r]	1916-	USGS	12/23/55	11.05[h]	4,920	1/21/69	9.30	2,810
Tuolumne River at Modesto	1,884	*1878-	USGS DWR	12/ 9/50	69.19	57,000[c]	1/27/69	65.42	32,600
Orestimba Creek near Newman	134[r]	1932-	USGS DWR	4/ 2/58	6.57[b]	10,200	1/25/69	8.40	5,080
Merced River at Pohono Bridge, near Yosemite	321	1916-	USGS	12/23/55	21.52[h]	23,400	6/2/69	11.34	8,070
South Fork Merced River near El Portal	241[r]	1950-	USGS	12/23/55	18.70	46,500	1/21/69	13.33	13,200
Merced River near Briceburg	691	1965-	USGS	---	---	---	1/26/69	17.00	20,100
Merced River near Stevinson	1,273[r]	1940-	USGS USBR DWR	12/ 5/50	73.79	13,600[c]	2/25/69	70.56	7,180
Chowchilla River at Buchanan Dam Site, near Raymond	235[r]	1921-23 1930-	USGS DWR	12/23/55	16.50	30,000	2/24/69	12.92	13,700
Fresno River near Knowles	133[r]	1911-13 1915-	USGS	12/23/55	11.52	13,300	2/24/69	9.18	7,640

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. M.	Period of Record	Source of Record (a)	Previous Maximum of Record Date	Stage in ft.	Dischg. in cfs	1968-69 Water Year Date	Stage in ft.	Dischg. in cfs
Central Valley Area (Continued)									
Fresno River near Daulton	258[r]	1941-	USGS USBR	12/23/55	12.64	17,500	2/24/69	12.69	17,300
Willow Creek at Mouth near Auberry	130	1952-	USGS	12/23/55	28.5[h]	15,700[c,r]	1/21/69	17.44	6,160
San Joaquin River below Kerchoff Powerhouse, near Prather	1,480	*1910-	USGS	12/23/55	51.0[h]	92,200[c]	1/26/69	30.46	26,100[c]
San Joaquin River below Friant	1,675	*1907-	USGS	12/11/37	23.80[b]	77,200[c]	6/9/69	11.68	12,400[c]
San Joaquin River near Mendota	4,310	1939-	USBR	6/ 1/52	-	8,840[c]	6/14/69	14.75	6,360[c]
Eastside Bypass near El Nido	-	1964-	DWR	4/26/67	16.14	11,250	2/25/69	17.58	21,700**
San Joaquin River at Fremont Ford Bridge	7,619[r]	1937-	USGS USBR DWR	4/ 6/58	74.91	5,910[c]	2/26/69	68.05	8,500**
San Joaquin River near Newman	9,524[r]	1912-	USGS DWR	3/ 7/38	65.81	33,000[c,g]	2/28/69	65.92	28,300
San Joaquin River near Vernalis	13,540[r]	*1922-	USGS	12/ 9/50	32.81	79,000[c]	2/27/69	34.55	52,600
Kings River below North Fork	1,342	1951-	USGS	12/23/55	23.08	85,200	1/25/69	16.00	29,000
Kaweah River at Three Rivers	418	1958-	USGS DWR	12/ 5/66	19.0	73,000	1/29/69	12.49	24,200
Tule River near Springville	225	1957-	USGS	12/ 6/66	19.7	49,600	1/25/69	11.40	18,500
Tule River below Success Dam	393	1953-	USGS	12/23/55	21.65[b]	27,000	2/28/69	--	3,210[c]
Kern River at Kernville	1,009[r]	1905-12 1953-	USGS	12/ 6/66	22.2	74,000	1/25/69	14.00	26,900
Northern Lahontan Area									
Willow Creek near Susanville	92.5	1950-	USGS	2/ 1/63	5.59	816	1/21/69	5.43	744
Susan River at Susanville	192	*1900-	USGS	12/22/64	7.30	5,100	1/21/69	6.46	3,350
Little Truckee River above Boca Reservoir near Boca	146	1903-10 1939-	USGS	2/ 1/63	9.00	13,300	4/23/69	3.39	2,030
Truckee River at Farad	932	1899-	USGS	11/21/50	14.5[h]	17,500	5/11/69	7.73	3,770
East Fork Carson River below Markleeville Creek near Markleeville	276[r]	1960-	USGS	1/31/63	8.21	15,100	5/27/69	6.56	3,530

Table 11 (Continued)

Stream and Station	Drainage Area in Sq. Mi.	Period of Record	Source of Record (a)	Previous Maximum of Record			1968-69 Water Year		
				Date	Stage in ft.	Dischg. in cfs.	Date	Stage in ft.	Dischg. in cfs
Northern Lahontan Area (Continued)									
West Fork Carson River at Woodfords	65.6	*1900-	USGS	2/ 1/63	9.00	4,890	5/13/69	4.16	1,240
West Walker River below Little Walker River near Coleville	180[r]	1938-	USGS	11/20/50	8.10	6,220	6/4/69	5.74	3,470
East Walker River near Bridgeport	359[r]	1921-	USGS	6/19/63	4.64	1,390	6/4/69	3.94	1,050
Southern Lahontan Area									
Mojave River at Lower Narrows near Victorville	530	1899-06	USGS	3/ 2/38	18.7	70,600[c]	1/25/69	13.50	33,800[c]
Mojave River at Barstow	-	1930-	USGS	3/ 3/38	8.60	64,300[c]	2/25/69	6.80	30,000[c]
Mojave River at Afton	-	1929-32 1952	USGS	12/31/65	7.92	4,150	1/26/69	10.40	18,000**

LEGEND

(a) USWB - United States Weather Bureau
USCE - United States Corps of Engineers
USGS - United States Geological Survey
USBR - United States Bureau of Reclamation
DWR - Department of Water Resources
PG&E - Pacific Gas and Electric Company
b - Site and/or datum then in use
c - Affected by storage and/or diversion
d - Discharge over weir
e - Estimated
f - Includes flow through powerhouse
g - Includes flow bypassing station
h - From flood marks
j - Crest stage gage
k - Discharge not determined; affected by backwater
m - Maximum observed
n - From DWR telemetering log
p - Due to failure of partially completed Dam
r - Revised
* - Incomplete record
** - Maximum of Record

Copies of this bulletin at $2.00 each may be ordered from:

Office of Procurement
DOCUMENTS SECTION
P.O. Box 20191
Sacramento, California 95820

Make checks payable to STATE OF CALIFORNIA.
California residents add 5 percent sales tax.